pp. 211-342] March, 1952

TROPICAL DISEASES BULLETIN

VOL. 49] 1952 [No. 3

MAIN CONTENTS

For detailed Contents see pp. ii, iv, vi, vii, viii, x, xii and xiv.

Issued under
the Direction of the
Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, London, W.C.1
(Telephone: MUSEUM 3041)

Price 5/6 net] *Entered as Second Class Matter in the U.S.A. Post.* Annual Subscription (Jan.–Dec.) 50/-

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol. 49] 1952 [No. 3

SUMMARY OF RECENT ABSTRACTS*

III. MALARIA

Epidemiology

VAN NOORT (p. 843) has written a monograph on the influence of malaria in N. Holland, and the use of spleen examination in malaria control. This can hardly be summarized further.

A comprehensive account of the course of malaria in Spain from the beginning of the century is given by RICO-AVELLO Y RICO (p. 854). *P. vivax* accounts for most of the cases, but *P. falciparum* and *P. malariae* also occur. A list of anophelines is given. Particular attention is paid to the increase which occurred after the civil war. An epidemic of malaria in one district, which was probably the result of war conditions, is described by CHOZA FERRER and PINERO CARRILLO (p. 106).

In the Ferrara district of Italy malaria, which previously had been declining, became almost epidemic after devastation caused by war, but SANI (p. 318) shows that the results of the use of DDT were spectacular.

In Turkey malaria is endemic in the costal areas, but although it is found in some parts of the inland areas, it is rare in the hills. NOYAN (p. 606) states that the vectors are *A. sacharovi* and *A. superpictus*, but many other anophelines are found. DDT is now widely used.

A note on premunition in bovine piroplasmosis and human malaria, in Algeria, has been contributed by SERGENT and PARROT (p. 516).

An account of malaria in the garrison of a place in Spanish Morocco is given by PICASO GUILLEN (p. 108) ; the use of DDT and drug suppression has apparently contributed to the considerable reduction which has taken place. He also describes a new concentrated thick-drop method of blood examination. HUGONOT (p. 510) describes an epidemic of *P. falciparum* and *P. vivax* malaria in a small community in the Sahara, where *A. multicolor* re-established itself after having been absent for 17 years. This mosquito could develop in water of high salinity.

SCHWETZ (p. 511) describes a small malaria survey in Uganda, where there was heavy incidence in early life and where *A. funestus* and *A. gambiae* are found. Notes on blood surveys carried out near Lake Albert and Lake Kivu are contributed by SCHWETZ *et al.* (p. 855). Although it is difficult to measure

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1951, v. 48. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

the importance of malaria as a cause of death in Africans, DUREN (p. 1059) quotes figures from the Belgian Congo which indicate that it is a cause of high mortality in infancy and childhood ; so high that major measures should be taken to control the disease.

A description of South-West Africa is given by SCHOEMAN (p. 1060), who states that *A. gambiae* and *A. funestus* occur in the northern part of the country. Spleen rates in the parts surveyed varied from 0·5 to 85 per cent. ; *P. falciparum* is the common parasite.

PAYET (p. 430) writes on the malaria of infants and young children of the high plateaux of Madagascar. Suppressive treatment with mepacrine once each week has made some, but not much, difference to their spleen rates. A report on malaria in the Comoro Islands, near Madagascar, is contributed by LAVERGNE (p. 1060), who describes the physical features, the vectors (chiefly *A. gambiae* and *A. funestus*), and the degrees to which the people of the various islands are subject to the disease. In some parts it is hyperendemic.

DE MELO (p. 607) writes of malaria in Goa, where *A. stephensi* and *A. fluviatilis* are the vectors.

The infant mortality in Ceylon has always been high, and ABHAYARATNE (p. 1062) shows that since 1900 there have been 10 peaks of excessively high infant mortality ; 7 of these coincided with epidemics of malaria, and 2 with epidemics of influenza. The highest rates were in the highly endemic dry zone.

In an important series of papers FARINAUD *et al.* (p. 6) describe the malaria situation in the mountain population of southern Indo-China. It is hyperendemic in the high plateaux where the important vectors are *A. minimus* and *A. jeyporiensis*. In experimental work on various groups of people the authors showed that malaria could be controlled, and found that DDT gave better results than chemoprophylaxis. A demographic study indicated that there is no natural increase of population in these areas.

BLACK (p. 323) shows that although there was little evidence of malaria in part of Northern Australia in which he carried out a survey, epidemics have occurred in the past, and there exist several species of *Anopheles* which are capable of transmission. A detailed account of the malaria problem in Australia and the Australian Pacific Territories has been written by FORD (p. 4), who shows that malaria is hyperendemic in the islands of Melanesia, and exists north of 19°S. latitude and west of 170°E. longitude. In northern Australia epidemics occur and the vector is *A. punctulatus farauti*. In Melanesia some attempt to use DDT has been made, but the habits of the vector, *A. punctulatus punctulatus*, usually permit only minimal contact with the treated surfaces, and the striking results achieved elsewhere are not to be expected. One of the greatest problems is to prevent the introduction of vectors into Fiji, Samoa and the uninfected Micronesian islands.

The continued downward trend of malaria in the United States is reported by FAUST *et al.*(p. 108), ANDREWS *et al.* (p. 430), and QUINBY (p. 512). The rapid decline of malaria in part of south-west Georgia is described by GOODWIN (p. 319). The area had been closely watched, and prompt treatment had been given to all persons with symptoms suggesting malaria ; economic conditions had also improved. There was no evidence that the decline was due to reduced anophelism.

In Guadeloupe *P. falciparum* is responsible for most of the malaria, and *P. malariae* for the rest ; *P. vivax* is not found. LANGUILLON (p. 608) has written an account of the situation.

MACKIE *et al.* (p. 857) have made a malaria survey of the Republic of Dominica, and find, in general, a low incidence rate. The anophelines are *A. albimanus* and *A. grabhami*.

A long and detailed account of malaria in Surinam is given by VAN DER KUYP (p. 109) ; in the interior there is hyperendemic *P. falciparum* infection, probably spread by *A. darlingi* ; on the coast *P. vivax* and *P. malariae* are more prevalent, probably carried by *A. aquasalis*.

Evidence from material taken at viscerotomy indicates that malaria occurs throughout almost the whole of Brazil, especially in the north, and in the valley of the Amazon (PARÁ, p. 857). DE MIRANDA (p. 431) reports on malaria in the State of São Paulo, Brazil, and DE MELLO (p. 431) writes of part of São Paulo in which epidemics occur (two-thirds *P. vivax* but exceptionally *P. falciparum* predominating). The main vector is *A. darlingi*. The incidence of *P. malariae* infection in São Paulo (which is low) is discussed by SCHIAVI and DE MELLO (p. 857).

MONTALVÁN (p. 856) gives an account of malaria in Ecuador, showing that it may be responsible for a considerable proportion of deaths. The important vectors are *A. albimanus*, *A. pseudopunctipennis* and *A. punctimacula*.

MÖLLHAUSEN (p. 107) points the moral that water engineers in hot climates may do immense harm unless they work with hygienists and malariologists.

Transmission

HODGKIN (p. 10) discusses the dissection of mosquitoes for malaria parasites, with examples of results obtained in some Malayan species. He makes the point that mosquitoes should be dissected as soon as possible after capture ; otherwise artificial infections or fictitious sporozoite rates may be produced, and biological studies may be misleading.

HAHN *et al.* (p. 132) have shown that the development of sporozoites in infected mosquitoes can be prevented by giving them glucose solution containing radio-active phosphorus (as phosphate) after the infective feed. This did not, however, prevent the development of oöcysts. The mosquitoes were not harmed.

SCHUBERT and KELLEY (p. 432) discuss the technique of precipitin tests for determining the species of host blood in mosquitoes.

LAVEN (p. 110) has used the scale index in differentiation of species of the *A. maculipennis* group. WEYER (p. 608) thinks that the various races of *A. maculipennis* are in fact species. He discusses the increase in malaria in Germany since the war, which is the result of closer contact between man and mosquito and of the increase in parasite carriers. Malaria has occurred in Schleswig-Holstein since the end of the war, and STEINIGER (p. 111) has made a study of the members of the *A. maculipennis* group there.

Observations on the biology of *A. claviger* and three races of *A. maculipennis* in Switzerland are given by BÜTTIKER (p. 320), but for details the original should be consulted.

Certain foci of malaria exist in Styria, and KUPKA and ANSCHAU (p. 229) show that anophelines breed in carp ponds and clay pits.

Two races of *A. maculipennis* (*messeae* and *typicus*) are found near Warsaw (DYMOWSKA, p. 859).

ROMEO VIAMONTE (p. 778) has written a monograph on the anophelines of Spain, the Canary Islands, the Balearic Islands, and Spanish Morocco, and discusses their relation to malaria. The information cannot satisfactorily be abstracted, and the original, which is full and clear, should be consulted.

Vincenzo ROMEO (p. 230) discusses the anophelines of Calabria, Italy, where *A. maculipennis labranchiae* and *A. superpictus* are the vectors. He also discusses the differentiation of larvae of *A. m. labranchiae* and *A. m. typicus*. In south-west Sicily, where the sole anopheline is *A. maculipennis labranchiae*, the incidence of malaria is bimodal—*P. vivax* in spring and *P. falciparum* in

late summer. The incidence was high in a poor community, but BUONOMINI *et al.* (p. 230) show that during the war the institution of prompt treatment of infected persons, and the use of anti-larval methods, brought great improvement.

EICHLER (p. 948) discusses the breeding of *A. maculipennis atroparvus*, *A. m. labranchiae* and *A. sacharovi* in relation to salinity of water, and describes a simple technique for determining salinity. He (p. 1063) discusses the habits of *A. maculipennis messeae*, *A. m. typicus*, *A. m. atroparvus* and *A. hyrcanus*, in S. Russia. EICHLER *et al.* (p. 1064) describe *A. hyrcanus* in Yugoslavia and S. Russia ; although a vector there, it is probably less important than races of *A. maculipennis*.

A study of the common anophelines of Morocco has been published by GAUD *et al.* (p. 609). The cultivation of rice in Morocco has until recently been opposed because rice-fields are suitable for the breeding of *A. maculipennis sicaulti*. GAUD *et al.* (p. 433) show that when cultivation was started at two places, in the hope that mosquito breeding could be checked by insecticides scattered from aircraft, severe outbreaks of malaria occurred because larval control was delayed or insufficient. They give advice on future control measures.

VERMEIL and DOBY (p. 9) report *A. dthali* from southern Tunisia, for the first time.

Notes on the anophelines of Ethiopia have been published by GIAQUINTO-MIRA (p. 677).

In a series of observations carried out in a coastal area of Tanganyika, MUIRHEAD-THOMSON (p. 512) showed that although there is a form of *A. gambiae* which can develop in water of high salt content, it is not the same as *A. melas* found in W. Africa. It is apparently a vector of malaria, but not so efficient as the fresh-water form, and it is a carrier of filariasis. Details of the studies are referred to.

Near Lagos, Nigeria, several species of mosquitoes breed in crab-holes in the mangrove zones ; these include *Aëdes* spp. and *Anopheles melas*. BRUCE-CHWATT and FITZ-JOHN (p. 859) have studied the formation of these holes, and the water contained in them, and have devised means of treating them with calcium carbide or with BHC ; the former kills the crabs.

A practical guide to the anophelines of French West Africa has been published by HOLSTEIN (p. 9). In French West Africa there are two waves of attack by *A. gambiae*, soon after dark and between 2 and 3 a.m. BERNET (p. 111) thinks that the first of these is the more important since most people are protected by bed-nets from the second.

In part of the Central Provinces, India, the chief vector appears to be *A. fluviatilis*, with *A. culicifacies* playing a minor part. A list of anophelines taken and examined is given by SUBRAMANIAN and SEN GUPTA (p. 433).

In East Bengal (Pakistan) *A. philippinensis* is the chief vector, and although the greatest amount of transmission takes place from September to November, QURAISHI *et al.* (p. 1064) show that there is considerable breeding before the monsoon, in April to June, in marshes and branches of rivers which have been cut off from the main stream. Transmission occurs at this season also.

MACAN (p. 231) reports a study of the anophelines of parts of Bengal and Burma. He makes the important point that to search only in the daytime for anophelines in houses gives a false and misleading picture of the mosquito population. The known and suspected vectors are named, and the author points out that *A. philippinensis* attacks man out of doors, and does not rest in houses, and in this way avoids surfaces treated with insecticides. KUITERT and HITCHCOCK (p. 513) show that in N. Burma in 1944 *A. leucosphyrus* was

an efficient vector of malaria. It bred in a great variety of waters and became the predominant adult anopheline caught from June to August. A sharp rise in malaria incidence in July was significantly correlated with the percentage of *A. leucosphyrus* larvae among identified larvae, and with rainfall, but a rise in numbers of larvae in October and November was not reflected in the incidence of malaria.

Wharton (p. 111) shows that in Malaya *A. maculatus* tends to rest under ferns beneath the trees near the breeding places in the vicinity of labourers, lines and cattle sheds. Other species favoured rather different places. *A. maculatus* was the commonest species found, and most of the females had had blood meals, 20 per cent. of which were human. An account of mosquitoes of the *A. umbrosus* group in Malaya is given by Reid and Hodgkin (p. 321) who show that *A. letifer* is an efficient vector. *A. umbrosus* is capable of being a serious vector but is limited by its restriction to jungle swamp ; the status of *A. baezai* is uncertain, but it may be dangerous where it is abundant ; there are epidemiological grounds for suspecting *A. roperi*.

van Hell (p. 322) discusses the anophelines of southern Celebes, and names the vectors of malaria. A study of the significance of *A. hyrcanus X* as a vector of malaria has been made by the same author (p. 514). It is found in many parts of Indonesia, especially S. Celebes, and breeds in rice-fields and ponds. It is capable of maintaining malaria, but it can be controlled by attention to rice-fields and public works.

Of the 42 species or subspecies of *Anopheles* reported from Borneo only 16 have been dissected, and in only 4 have sporozoites been recorded ; McArthur (p. 434) shows once more that *A. leucosphyrus* is of great importance in transmission, and *A. maculatus* of little importance there. He (p. 1065) reviews modern knowledge of the various forms of *A. leucosphyrus* in relation to malaria. The type form, and the variety *hackeri*, are important in transmission. *A. leucosphyrus* is a most important species in many countries of the Far East.

Smith *et al.* (p. 112) show that *A. minimus flavirostris* has been found in the Philippines in rice-fields and other places which were not formerly recognized as breeding places. Gravid and newly emerged females of this species can fly between 640 and 2,016 metres down-wind (Ejercito and Urbino, p. 703).

The ciliate *Vorticella microstoma* attacks third- and fourth-instar larvae of *A. quadrimaculatus*, but not *C. fatigans* and *Aëdes aegypti* (Micks, p. 113). Burgess and Young (p. 11) found *A. freeborni* more susceptible than *A. quadrimaculatus* to infection by the St. Elizabeth strain of *P. vivax*. Eyles and Young (p. 231) found *A. quadrimaculatus* more susceptible than *A. albimanus* to infection by a South Carolina strain of *P. falciparum*, but Jeffery *et al.* (p. 704) show that two strains of *A. albimanus* were more susceptible than a strain of *A. quadrimaculatus* to infection by a Panama strain of *P. falciparum*.

In an investigation carried out in Jamaica and Trinidad, Muirhead-Thomson (p. 704) has shown that *A. albimanus* and other anophelines bite adults much more than children. This preference is doubtless associated with the comparative rarity of malaria in infants. In comment Macdonald remarks that it has commonly been assumed that mosquito bites are distributed at random, but this new work shows that this is not necessarily so, and may entail revision of judgment on some problems of malaria. Rehn *et al.* (p. 113) report a series of field studies on the bionomics of *A. albimanus* ; these are somewhat inconclusive.

In a study carried out in Trinidad, Pittendrigh (p. 115) has shown that neither the largest nor the most abundant species of bromeliads are important in the breeding of *Kerteszia* species. These can safely be ignored, with a consequent reduction in the cost of control.

Senior WHITE (p. 232) discusses the distribution of anophelines round the Caribbean area, in relation to geological formations.

VARGAS (p. 10) discusses malaria along the border between Mexico and the United States, and names the vectors.

The growth changes of eggs of *A. albimanus*, *A. pseudopunctipennis* and *A. aztecus* in water of different degrees of salinity have been studied by DOWNS (p. 609). Development of the embryos took place up to 0·2 or 0·3 N, but not at higher salinities.

Though *A. pseudopunctipennis* in Mexico feeds on man, it prefers animals. BORDAS and DOWNS (p. 779) show that it feeds mostly out of doors at night, and rests in houses during the day. This behaviour explains the success of DDT residual spray campaigns in those areas where it is the chief vector of malaria.

For the first time, BRENNAN (p. 515) reports *A. crucians* from Guatemala.

A study of the reactions of *A. darlingi* and *Culex fatigans* to various conditions of light and of composition of water in relation to oviposition is reported by DE ZULUETA (p. 232). DEANE *et al.* (p. 114) have found that *A. darlingi* and *A. aquasalis* captured in houses in Belém, Brazil, show a very high proportion containing human blood. Specimens of *A. darlingi* bred in the laboratory and offered the choice of 8 animals (including man) still showed preference for man, but similarly bred *A. aquasalis* preferred cow and horse. RACHOU and GABERLINI (p. 434) report, for the first time, the finding of naturally infected *A. darlingi* in the State of Paraná, Brazil.

CORREA *et al.* (p. 114) show that in Brazil the flight range of *A. albitarsis domesticus* may be up to 13 kilometres, and its longevity up to 5 months.

DE LUCENA (p. 435) has studied the house-frequenting habits of *A. tarsimaculatus* (*aquasalis*) in part of Brazil. It enters and rests in houses after daylight, and is associated with epidemics of malaria ; but it is becoming rare as a result of the DDT campaign.

RACHOU (p. 1066) reports a study of the eggs of certain anophelines of the subgenus *Kerteszia* in Brazil.

A preliminary study of the mosquitoes of Eastern Colombia is recorded by DE ZULUETA (p. 114).

The anophelines of Paraguay are discussed by RACHOU *et al.* (p. 324).

ROBERTS (p. 515) reports on the anopheline mosquitoes of N. Queensland, Australia, where *A. farauti* is the only considerable vector of malaria. The names and breeding habits of several other species are given. PERRY (p. 112) has published a study of *A. farauti* in the Solomon Islands, where it breeds in streams with emergent vegetation, and in a great variety of depressions in the ground. It is closely associated with man, appears to fly between 5 and 8 p.m., and can travel about 1,000 yards to feed on man.

The natural enemies of mosquitoes (including anophelines) in New Britain are discussed by LAIRD (p. 322). Details should be sought in the original.

SITNITSKAJA (p. 611) discusses *P. vivax* malaria acquired from transfused blood, and quotes cases in which the blood had been preserved for 6 days. It is therefore not true that *P. vivax* in preserved blood dies out within 4 days. Two cases of transfusion malaria are reported by DRUKKER and DE VRIES (p. 119).

Aetiology

SHORTT *et al.* (p. 701) give a full account of the experiment which proved the existence of pre-erythrocytic schizonts of *P. falciparum* in a volunteer who was exposed to infection by bite on 3 successive days. They show that this man's blood became infective within 135 hours after the first infective mosquito bites. Liver biopsy revealed schizonts aged 4, 5 and 6 days, the last being

mature. There is presumptive evidence that *P. falciparum* does not continue its development in the tissue cells beyond the pre-erythrocytic stage ; in this respect it differs from *P. vivax* and *P. cynomolgi*. In a discussion of the exo-erythrocytic forms of malaria parasites, SHORTT (p. 110) brings out the point that there is strong evidence that the cycle in the liver not only persists after the erythrocytic cycle has been established, but [except for *P. falciparum*] may continue after the termination of the blood infection, to be the source of relapses.

GARNHAM (p. 608) discusses the probable series of events in malarial relapses, which originate from the exo-erythrocytic forms in the liver. In *P. falciparum* infection there is no continuous formation of these forms from previous exo-erythrocytic schizonts, and there are no true relapses, though recrudescences occur which are due to multiplication of parasites which have continuously been present in the blood. As a result of observations on blood-induced *P. malariae* and *P. cynomolgi* infections, on the other hand, CORRADETTI and VEROLINI (p. 437) think that relapses in malaria originate, not from exo-erythrocytic forms but from a few blood forms which persist in sub-patent numbers until immunity diminishes, when they are able to proliferate. In comment, GARNHAM remarks that these authors do not exactly define a relapse, by which is meant an attack following a primary attack, with a parasite-free interval between them. The "relapses" of the authors may have been recrudescences due to persistent low parasitaemia. Similarly, ASCOLI and d'ALESSANDRO (p. 431) think that relapse in malaria is due to parasites which have continued an erythrocytic cycle in the vessels of some internal organ, for instance the spleen. This belief is based on the fact that relapse can be provoked by intravenous adrenaline. BAISHEVA-ZEJNALOVA (p. 612) also discusses relapses, which she thinks always originate from erythrocytic forms present in the blood. She makes no reference to the recent work of SHORTT and his colleagues.

GARCIA (p. 9) claims to have seen an exo-erythrocytic schizont (presumably of *P. vivax*) in the peripheral blood.

SHUTE and MARYON (p. 702) have studied in England the production of gametocytes in patients infected with *P. falciparum*, either by mosquito bite or by blood injection. More than half of the infected persons produced gametocytes in appreciable numbers, but never after the primary attack had been cured by drugs. Sub-therapeutic doses of drugs, however, appeared to stimulate their formation. The authors discuss the implications of this work.

JASWANT SINGH and NAIR (p. 1063) describe abnormal forms of *P. vivax* in an infant in India.

Pathology

In a long and closely reasoned paper SERGENT (p. 317) discusses the various relationships which may exist between host and parasite, particularly in relation to premunition, which he defines and illustrates.

UEBEL (p. 116) describes the pathological appearances in 4 cases in Macedonia in which malaria was regarded as the primary cause of death. In two he regards the fatal infection as due to *P. vivax*. Details should be sought in the original.

TELCHAROV and TODOROWA (p. 517) have examined the liver by puncture, in 45 patients with *P. vivax* malaria, and describe the findings in detail. They have also examined serial sections of the liver of an infected monkey, but have not found exo-erythrocytic forms of the parasites.

CICCONARDI (p. 233) has found that reticulocytes are much less susceptible to infection with *P. falciparum* than *P. vivax*.

RIGDON (p. 119) discusses the phenomenon of sludged blood in disease (including malaria). He finds little evidence that this leads to thrombosis or infarct, and thinks that a common factor in all conditions showing sludging is a disproportion between the amount of plasma and the number of red cells, in the condition of haemoconcentration. The escape of fluid from the blood into the tissues is probably the result of prevailing anoxia of the endothelial cells.

FUHRMANN and KNÜTTGEN (p. 117) studied serum iron in malaria. They conclude that the anaemia of malaria is not due simply to destruction of red cells, but that there are other factors, including interference with iron metabolism.

WOZONIG (p. 324) describes the changes which take place in the protein content and colloidal reactions of the cerebrospinal fluid in malaria. These correspond roughly to the blood sedimentation rate, and this indicates that there is a relation between the plasma and the cerebrospinal fluid changes. He has also studied the permeability of the blood-brain barrier in malaria.

OVERMAN *et al.* (p. 118) have studied the blood plasma, extracellular fluid and ionic balance during convalescence from therapeutic malaria.

Diagnosis

DONALDSON and BROOKE (p. 436) have previously shown that when several blood slides are stained together in containers by Giemsa's method, elements from one slide, including malaria parasites, may be transferred to others. They have now tried various modifications of technique to avoid this source of error, but the only apparently completely successful method was to add the surface-active substance Triton X-30 to the staining solution, to a strength of 0·5 per cent. This probably causes detached blood elements and parasites to sink in the staining fluid.

VAN DEN BERGHE and CHARDOME (p. 1067) claim that examination of dermal capillary blood, obtained by scarifying and squeezing the skin in the middle of the scapular region, provides more positive results than examination of ordinary thick smears for microfilariae and for malaria parasites.

HEINKEL (p. 705) has devised a method of estimating the number of malaria parasites in blood by a counting technique. He has also studied the time of appearance of the various stages of parasites in the blood.

HORMANN (p. 234) thinks that the serum flocculation tests are not of much value in the diagnosis of malaria, but that they do indicate immune response, and may therefore be useful in prognosis. SUTLIFF *et al.* (p. 11) show that the complement-fixation test with *P. knowlesi* antigen may have a value in diagnosis when other evidence of malaria is not present. MEYTHALER and SCHAIBLE (p. 1066) discuss in general terms the relationship between malaria and the Wassermann reaction.

Clinical Findings

LE VAN HUNG (p. 706) discusses malaria and pregnancy, as seen in Saigon. BYSTRITSKIJ (p. 612) reports 28 cases, and SICÉ and BINDER (p. 780) one, of congenital malaria.

NAVARRO and SANTIAGO (p. 779) discuss splenomegaly in malaria, and JUSTESEN and KOOLSBERGEN (p. 119) report a case of rupture of the spleen in a patient with malaria; the immediate cause was apparently the act of vomiting.

DE FRANCESCO and d'IGNAZIO (p. 949) refer to acute abdominal conditions in relation to malaria.

VAN DER KUYP (p. 437) discusses the relationship between malaria and renal disease; there seems to be a connexion between *P. malariae* infection and

nephritis, which can be prevented by early treatment. *P. falciparum* plays little part, and *P. vivax* none, in producing nephropathy. LIPPI (p. 233) has made a study of the renal function in chronic malaria, but there is only slight evidence of abnormality. A case is described by FLETCHER (p. 519) in which infection with *P. falciparum* apparently caused an adreno-renal syndrome, which is described. There was dramatic response to proguanil.

HAAS (p. 854) discusses the question of provocation in inducing manifestations of *P. vivax* malaria.

A study of infection with the Chesson strain of *P. vivax* leads COATNEY *et al.* (p. 518) to the conclusion that this infection, when induced by mosquito bite, can exist for 18 months. The duration of infection, and the number of relapses, appear to be related directly to the size of the inoculum.

GRENNAUS *et al.* (p. 611) describe the acute fulminating form of *P. vivax* malaria which occurs in central U.S.S.R., and which may be fatal within a few hours. They emphasize the convulsions and coma which occur, and the great importance of immediate treatment without delay for examination of blood.

SEAL (p. 861) describes a case in which *P. vivax* was responsible for allergic symptoms.

NOYAN (p. 861) writes of malaria in Turkey, giving a description of the anaphylactic form ; THIODET (p. 120) sees close analogies between malaria and anaphylactic shock, and has devised a method of desensitization.

MORETTI (p. 120) holds the view that pernicious algid malaria is an example of medical shock appearing during an attack. This leads to recognition of the importance of restoring the volume of circulating blood, and of immediate treatment of the malaria.

Discussing the severity of malaria in the 1949 outbreak in Tunisia, DANA *et al.* (p. 436) report a fatal case of *P. vivax* and several of *P. falciparum* infection. In such an epidemic the disease may be present in various forms when the patient is first seen and delay in diagnosis may be fatal. It is therefore justifiable to give injections of quinine without waiting for confirmation of diagnosis.

MÖLLHAUSEN (p. 107) refers to the severity of malaria which affected German troops in Greece in the two wars, and to the serious effect the disease at that time had on the Greek people. Both *P. vivax* and *P. falciparum* were present, and the severity of the latter was very noticeable. He discusses these matters at length.

An outbreak of *P. falciparum* malaria in the crew of a Norwegian whaling ship who spent part of their time in the French Congo before returning by air to Norway is described by KNUTSEN (p. 701). Suppressive mepacrine had been ignored or insufficiently taken at the relevant times. There were several severe cases, and two deaths. *Charles Wilcocks*

MALARIA

TRÜB, C. L. P. & WANJURA, H. Die Malaria im Lande Nordrhein-Westfalen in Vergangenheit und Gegenwart. [**Past and Present Malaria in North Rhenish Westphalia**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, Oct., v. 3, No. 2, 144–58, 3 charts & 1 map. [13 refs.]

This paper is of local interest as it concerns the number of malaria cases diagnosed in North Rhenish Westphalia from the 1st January 1946 to 31st December 1950.

This area had been well known as an endemic zone in former times. Most of the malaria was imported by soldiers returning from the war or by refugees.

Nevertheless 119 autochthonous cases were recognized with certainty and were all of the benign tertian type. In the uncertain autochthonous group 135 were enumerated with 131 benign tertian and 4 subtertian. Among these were 28 war malarias and 43 of refugee origin.

The largest group was made up of malarial relapses, totalling 1,177, of which 1,144 were benign tertian, 4 quartan and 29 subtertian. Since 1948, the peak year, the number of malaria cases notified has been steadily diminishing.

Philip Manson-Bahr

Sergent, Ed. & Collignon, E. Les apports de virus palustre, de 1946 à 1950, dans les Marais des Ouled Mendil assaini. [**Introduction of Malaria Infection into the Reclaimed Ouled Mendil Marshes from 1946 to 1950**] *Arch. Inst. Pasteur d'Algérie.* 1951, June, v. 29, No. 2, 120–22, 1 plan.

The interesting story of the conversion of the malaria-stricken swamps of Ouled Mendil into the healthy rural experimental station of the Pasteur Institute of Algeria was published in booklet form [this *Bulletin*, 1948, v. 45, 937]. Here malaria continues to be effectively controlled but there is an influx of *fellaheen*, infected with malaria, from nearby unsanitated areas. There are four such " villages " where malaria is endemic, within one kilometre distance of the Pasteur Institute experimental station with its two farms. To measure the importance of this constant influx of infected persons, children under the age of 15 have been examined each year in the spring and in the autumn. The spleen indices so disclosed, the average size of the enlarged spleens, and the splenometric indices are tabulated for each year from 1946 to 1950. The spring spleen indices have varied from 7 to 13 per cent. ; the autumn spleen indices from 5 to 15 per cent. With the exception of 1946 the autumn indices have been persistently lower than the spring indices which shows that, in the absence of malaria vectors, the introduction of infected persons has no harmful effect on the health of the local population.

Norman White

Jadin, J. & Fain, A. Contribution à l'étude du paludisme en pays d'altitude. [**Malaria at High Altitudes**] *Ann. Soc. Belge de Méd. Trop.* 1951, June 30, v. 31, No. 3, 353–63.

This report is concerned with the biology and distribution of the more prevalent *Anopheles* in Ruanda-Urundi and summarizes the results of an enquiry into the distribution of malaria in that territory. The authors have previously demonstrated the important rôle played by *A. funestus* as the chief vector of malaria in Ruanda-Urundi [this *Bulletin*, 1950, v. 47, 431].

The dark straw huts of the Banyaruanda afford shelter for goats and calves as well as for their human inhabitants and form very favourable resting places for anophelines. The latter are most numerous in huts at the foot of the hills, near the marshland in which the mosquitoes breed. *A. christyi* is most numerous in the enclosures in which cows are kept during the night. The most common breeding places of *A. funestus* are in stagnant drains which were constructed to reclaim land for cultivation. Breeding places of *A. christyi* are innumerable ; those of *A. funestus* relatively few ; those of *A. gambiae* very rare.

In 1949–50 collections of adult mosquitoes were made on the hills surrounding Astrida : there were 2,669 *A. funestus*, 2,121 *A. christyi* and 59 *A. gambiae*. Specimens of *A. demeilloni*, *A. marshalli*, *A. squamosus*, *A. ziemanni* and *A. mauritianus* were also found. *A. christyi* would have been more numerous had

cattle sheds been included in the buildings searched. Of 346 *A. funestus* dissected, sporozoites were found in 4, oöcysts in 9 and both in one. Two of 36 *A. gambiae* dissected were infected. Precipitin tests showed the marked predilection that *A. funestus* and *A. gambiae* have for human blood, and that *A. christyi* has for bovine blood.

The blood of some 500 inhabitants on each of 23 hills surrounding Astrida was examined : parasite rates ranged from 36 to 65 per cent., the majority from 45 to 60. For the total 11,894 examined the parasite rate was 51·13 per cent.

Norman White

Bruce-Chwatt, L. J. **Malaria in Nigeria.** *Bull. World Health Organization.* Geneva. 1951, v. 4, No. 3, 301–27, 1 fig. [13 refs.]

Nigeria is a square block of tropical Africa south of 14° north latitude, with an area of 372,674 square miles ; the coast is lined by mangrove swamp varying between 1 and 60 miles in depth ; inland is a 50–100 mile belt of rain forest merging into the interior of dry forest, open woodland and grass savannah. Most of the south is less than 1,000 feet above sea level and most of the north is between 1,000 and 2,000 feet ; the great River Niger traverses 840 miles from the north-west to its delta on the Gulf of Guinea, having been joined in the centre of the country by its large tributary, the River Benue. The annual rainfall diminishes from south to north, from 140 inches at Forcados to 25 inches at Maiduguri. Likewise the high humidity of the coastal zones diminishes towards the interior savannah, where climatic conditions are influenced by the dry north-eastern " Harmattan " wind blowing from the Sahara desert.

An estimated population of 24,388,470 has a density of 97 per square mile in the south and 40 in the north, and apart from the large towns in the south Nigeria is essentially a country of peasant farmers. The economy is seriously affected by animal trypanosomiasis and the full range of human tropical diseases, which the author has summarized.

The whole of Nigeria is malarious ; in the southern hyperendemic belt spleen rates in the 1–10 age-group are usually between 65 per cent. and 80 per cent., and in the northern endemic areas are variable, usually 50–60 per cent. *Plasmodium vivax* is rarely seen, 96 per cent. of all infections being due to *P. falciparum* and the balance to *P. malariae* ; double infections occur in 5–20 per cent. of all examinations. Crescents are seen in approximately 10 per cent. of infants, 20 per cent. of the 1–4 age-group, 12 per cent. of older children, 5 per cent. of adolescents and 1 per cent. of adults ; the average crescent density in carriers is low. Such factual information as is available of mortality in infancy and childhood due to malaria is tabulated.

Transmission is perennial in the coastal region, 8–9 months in the forest belt, and further north the season shortens to 6–7 months. Of some 28 anopheline species 8 have been found infected, but only 2 are widely distributed and of permanent importance, *A. gambiae* (and var. *melas*) and *A. funestus*. The curve of seasonal density of *A. gambiae* follows the rainfall curve, but that of *A. gambiae* var. *melas*, a brackish water-breeder, is related more to the tides. The distribution of *A. funestus* is patchy, because of its preference for clean, fresh water, but this anopheline may be the chief vector after the rains during the first half of the dry season. Average sporozoite rates are 5·89 per cent. for *A. gambiae* and 4·96 per cent. for *A. funestus* ; the highest recorded rates are 20 per cent. and 14 per cent. respectively.

No country-wide control programmes are in operation, but a special Malaria Service exists. In the period 1942–47, 6 square miles of tidal swamps breeding huge numbers of mosquitoes were reclaimed in the vicinity of Lagos. An

urban Experimental Anopheles Eradication Scheme has been instituted in the southern town of Ilaro. *R. Ford Tredre*

Bruce-Chwatt, L. J. **Gametocyte Rates.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, June, v. 44, No. 6, 761–3.

This is a comment on a paper by Shute and Maryon [this *Bulletin*, 1951, v. 48, 702]. The author points out that in the Table appearing in that paper, the gametocyte rates in blood films from Lagos refer to the proportion of *P. falciparum* gametocytes in certain age-group samples, representing a percentage of all examined slides. In the 0–1 age-group a large number of gametocytes were harboured by infants below the age of 3 months with a low parasite rate. Therefore, the gametocyte rate in relation to the total batch of infants examined may differ markedly from the rate in relation to the frequency of infections, which in West Africa depends on the age composition of the 0–1 group.

The gametocyte rates of the 0–1 and 1–2 age-groups in Lagos are shown in two tables. They do not differ markedly from figures for induced *falciparum* infections, whereas gametocyte densities in the latter are much higher than those occurring naturally in West Africa, where the mean densities are very low. *C. A. Hoare*

Cullumbine, H. **An Analysis of the Vital Statistics of Ceylon. Part III. Malaria in Ceylon.** *Ceylon J. Med. Sci.* Sect. D. 1950, Dec., v. 7, Pts. 3/4, 133–42, 1 fig.

For centuries malaria has been the major single cause of death and illness in Ceylon. Endemic malaria prevailed in two-thirds of the island ; epidemics occurred periodically, and in recent times the most severe swept over the south-west of the island in 1934–35. The immediate cause was prolonged drought, which resulted in extensive breeding of a mosquito vector which had a marked preference for shallow, isolated pools in dried river beds. " The spread of the disease was hastened and favoured and its virulence and fatality magnified by the gross undernourishment of the population, consequent upon a depression in the rubber industry and the impossibility of cultivating paddy during the drought." Those most severely affected were the old, the young and the expectant mothers in the districts normally the least malarious.

Malaria control measures concentrated on attacking mosquito larvae by such methods as the sluicing of streams, the oiling of rivers and streams and the training of rivers ; later the adult mosquito became the object of attention and since 1946 residual insecticides have been in use in all endemic areas.

The author shows by analysis of vital statistics in relation to malaria that " the efficacy of D.D.T. is altering the mortality pattern of Ceylon from that typical of the tropics to one typical of the more advanced Western peoples living in temperate climates " ; figures for the years before and after the introduction of residual spraying are tabulated adequately. As would be expected, malaria morbidity and mortality rates have been markedly reduced and spleen rates have declined rapidly, in varying degrees in different districts and in urban, rural and estate communities. Accompanying these results for malaria is a marked reduction in total deaths, infant mortality, maternal mortality and in some of the other major causes of death, including influenza, diarrhoea and pneumonia. The sudden fall in the infant mortality rate is due to a decrease in deaths from prematurity, debility and convulsions without any comparable reduction in the diarrhoea, enteritis, bronchitis and pneumonia groups. The maternal mortality rates from the toxaemias of pregnancy and

puerperium and from puerperal sepsis and convulsions have fallen considerably, but those from haemorrhage during pregnancy and puerperium have not.

It is difficult to assess accurately the full implications of the reduction of malaria mortality and morbidity ; in addition to the falls in mortality rates, expectation of life is increased, agricultural work is not impeded by fever, increased vitality and malaria eradication enable unworked land to be irrigated and exploited, nutrition of the people generally improves, and an increase in population is to be expected in the near future.

[An abstraction of the mass of figures is not possible and averages can be misleading, but the following give some indication of rates before and after the advent of residual insecticides :—General Death Rate per 1,000, 20·8 and 13·2 ; Malaria Death Rate per 1,000,000, 1,100 and 330 ; Maternal Mortality Rate per 1,000 births, 16·5 and 8·3 ; Infant Mortality Rate, 140 and 92.]

R. Ford Tredre

Raina, B. L. **Introduction to Malaria Problem in India.**

This book was reviewed on p. 210.

Watson, R. B. & Liang, K. C. **Seasonal Prevalence of Malaria in Southern Formosa.** *Indian J. Malariology.* 1950, Dec., v. 4, No. 4, 471–86, 8 figs.

This is a record of observations made in Ch'ao Chow, a town in Southern Formosa, and in its vicinity. The observations would seem to apply to most of the plains of Southern Formosa.

The people of Southern Formosa live in compact population units : isolated houses are rare. The average village has a population of 500, the smallest more than 200. Housing conditions are good, judged by oriental standards. The villages are surrounded by rice fields or by other irrigated crops such as sugar cane. These afford abundant facilities for the breeding of *Anopheles hyrcanus* var. *sinensis*. Margins of streams and irrigation channels are productive of *A. minimus*. These are the only two proved malaria vectors in the Ch'ao Chow area. *A. maculatus*, *A. tessellatus*, *A. annularis* and *A. sundaicus* also occur, but their prevalence is low. There are primary schools in the larger villages and there is a high level of literacy.

Information about malaria prevalence was obtained by the examination of infants and children up to 25 months old, the examination of primary school children, and the study of Japanese records. Blood films were taken from infants, at intervals of 30 days until the age of 25 months. During 1949 the children of two primary schools were examined monthly. Anopheline mosquitoes were collected at weekly intervals from animal-stable collecting stations throughout the district.

Infant malaria data show that the highest rate of malaria transmission was from the beginning of April to the end of May : the second highest rate was from the middle of October to the middle of December, but fresh infections occurred in every month of the year. The May peak of new cases occurs about 2 months after the peak of anophelism in the spring but the prevalence of *A. sinensis* was at a high level from mid-February to the end of April. *A. minimus* attained its peak density in April. The autumn peak prevalence of *A. sinensis* was in September and prevalence remained high till mid-October : the autumn peak of *A. minimus* prevalence was in mid-October. *A. sundaicus* may transmit malaria during the late winter, and *A. annularis* and *A. tessellatus* may be vectors during the autumn, but these three species are relatively unimportant.

The examination of schoolchildren showed that *P. falciparum* was the most prevalent species of parasite, 34 to 39 per cent., and that *P. malariae* infections were more frequent than *P. vivax* infections.

Norman White

SHORTT, H. E. **History of Recent Researches on Tissue Phases of the Malaria Parasite at the London School of Hygiene and Tropical Medicine.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Oct., v. 45, No. 2, 175–88. [15 refs.]

In his Festival of Britain lecture, the author gives an interesting and instructive account of the history of researches by himself and his collaborators, which culminated in the important discovery of the tissue phase of development of the human malaria parasites.

To GRASSI belongs the credit of having, in 1900, first suggested that some unknown stages of development of the parasite intervened between the inoculation of the sporozoites and the infection of the erythrocytes. However, SCHAUDINN's claim to have seen the sporozoites penetrating into red cells led to the abandonment of this hypothesis, which remained in abeyance for some 30 years, until RAFFAELE (1934) revived interest in it by the discovery of unpigmented forms in endothelial cells. Such forms were soon afterwards found by HUFF and BLOOM (1935) in bird malaria, and finally JAMES and TATE (1937) solved this question beyond all doubt, by describing the complete exo-erythrocytic development of *Plasmodium gallinaceum*. Thenceforth other workers continued the quest among various avian, reptilian and mammalian malaria parasites.

The author recounts his early efforts to discover the EE stages of *P. cynomolgi*, which were interrupted by the war, but resumed in 1945. The first attempts were unsuccessful, because—under the influence of the work on avian malaria—the tissue stages were sought for in the reticulo-endothelial system. But ultimately—by using " shock tactics " of inoculating a monkey with sporozoites from hundreds of mosquitoes—success was attained, and the EE stages of development of *P. cynomolgi* were found in the liver. This discovery served as a pointer for subsequent investigations in human malaria. Using similar experimental methods of infection and biopsy of the liver in human beings, the author and his associates finally traced the exo-erythrocytic development, first in *P. vivax* and finally in *P. falciparum*.

In the course of this work, it was also demonstrated that the EE stages of *P. cynomolgi* in the monkey persisted after the establishment of the blood infection and gave rise to malarial relapses.

It is impossible, in a " dry " review, to convey the vividness of the author's own narrative of the inside story of his investigations. Those who wish to be entertained, as well as instructed, should read the original. *C. A. Hoare*

SANDOSHAM, A. A. **Recent Advances in our Knowledge of the Parasitology of Malaria.** *Proc. Alumni Ass. King Edward VII College of Med.* Singapore. 1951, Sept., v. 4, No. 3, 167–73, 4 figs. (1 coloured.) [12 refs.]

MUIRHEAD-THOMSON, R. C. **Mosquito Behaviour in relation to Malaria Transmission and Control in the Tropics.**

This book is reviewed on p. 336.

GUELMINO, D. J. **The Physiology of *Anopheles maculipennis* during Hibernation. An Attempt to Interpret the Phenomenon of Gonotrophic Dissociation.** *Ann. Trop. Med. & Parasit.* 1951, Sept., v. 45, No. 2, 161–8, 2 figs.

" Gonotrophic dissociation is a complex process of physiological adaptation of anophelines for a lengthy hibernation. With the approach of winter, under

the influence of a gradual fall in temperature, the physiological mechanism of the flies changes as follows : (*a*) blood digestion is slowed down, while food assimilation is limited to substances necessary for the formation of adipose tissue ; (*b*) the formation of adipose tissue is a primary process and the cessation of the reproductive functions is secondary : under the antigonadotrophic influence of the adipose tissue, reproductive functions cease.

" Reactivation of the reproductive functions takes place when the adipose tissue is exhausted and its antigonadotrophic influence is consequently diminished. At the end of hibernation one blood-meal is sufficient to cause ovulation and oviposition. The importance of this blood-meal lies not so much in its quantitative albumen content, as in its stimulation of the gonadic apparatus of the anophelines, similar to that exerted by the gonadotrophic hormones in creatures of a higher order."

Eichler, W. Salzwasserverträglichkeit und Sommerphase des *Anopheles atroparvus*. [**Salt-Water Tolerance and Summer Phase in** *A. maculipennis* **var.** *atroparvus*] *Proc. 8th Int. Congr. Ent., Stockholm* 1948. 1950, 856–9. [Summary taken from *Rev. Applied Entom.* Ser. B. 1951, Sept., v. 39, Pt. 9, 158–9.]

The water of the Yanovskoe Lake, near the southern shore of the Sea of Azov and north of the Kuban River, has a very high salt content (2·17 per cent. at the end of August 1943). It is rich in magnesium sulphate, sodium and chlorine compounds, and organic impurities. *Anopheles maculipennis* var. *atroparvus* van Thiel, which breeds for preference in brackish water, is abundant in the immediate vicinity of the lake, forming an isolated population surrounded by pure populations of *A. m. messeae* Flni., with which apparently it does not intermingle. The salt concentration of the lake is reduced in winter, and the *atroparvus* larvae can develop in it in spring, but they cannot do so in summer when the concentration becomes too high for them. No Anopheline larvae were found in the lake on 11th July or 17th August 1943, and there were no other possible breeding places within several miles, but hundreds of adults (mostly females) were counted in an isolated house on 11th July, and almost equally large numbers (with a high proportion of males) were found in many houses in a village very near the lake, where they had persisted for over five weeks. Females taken near the lake at the end of August laid eggs in the laboratory. All were typical *atroparvus* eggs, except for a peculiarity of marking that was hardly sufficient to indicate a geographical race. The females chose river water from the Kuban in preference to undiluted lake water for oviposition, the only batch of eggs laid on lake water being abnormal. In experiments in which eggs laid on river water were put in batches of 40 in pans containing river water alone or various dilutions of lake water in river water, the greatest proportion of eggs (39 out of 40) hatched and larvae developed best in water with a salt content of 0·32 per cent. (15 per cent. lake water). The salt concentration that larvae could withstand increased as they grew older. This was thought to be an adaptation to the rising salt content of the lake in early summer. Development was possible in water with a salt content of 0·87 per cent. but not 1·52 per cent.

The author concludes that the females do not oviposit in summer, when no water suitable for the development of the larvae is available, and take only sufficient blood meals to support metabolism during this time. Only one generation is produced in the spring, but it is possible that a second develops in the autumn if the salt concentration in the lake falls soon enough.

[See this *Bulletin*, 1951, v. 48, 948.]

CAMPBELL, R. W. H. **A Preliminary Statistical Study of *Anopheles gambiae* Giles, based on Maxillary Indices.** *Bull. Entom. Res.* 1951, Nov., v. 42, Pt. 3, 647–58, 7 figs.

The maxillary indices (the total maxillary teeth divided by two) of *Anopheles gambiae* adults collected in the vicinity of Yundum Airport, Gambia, were examined with a view to comparing the results later with similar data for *A. melas*. But it was found that the distribution curve for the frequency of index values in this pure population of fresh-water *gambiae* did not conform to a normal distribution. Statistical treatment indicated that two populations of fresh-water *gambiae* with different maxillary index means (13·107, range 10 to 15·5, and 15·33, range 12·5 to 18) occurred in the area. Mosquitoes taken in window traps were found to be representatives of the 13·107 index group ; those taken in spray catches in houses were chiefly of the 15·33 index group. In further experiments in which indices were calculated for adults captured in cages as they emerged from natural breeding places, it was found that the 13·107 index group were taken mainly from casual water and adults falling within the other index group of 15·33 emerged from more permanent pools. There would appear to be a difference in behaviour of the two adult groups, as indicated by their predominance either in window traps or in spray catches in the houses. But it is noted that the group with the higher index (15·33), and which was predominantly found in permanent waters, had to fly further (over 2 miles) to reach the houses sampled. It is postulated that a fatigue-factor may have caused these to remain at rest inside the houses, rather than fly to exits (and window traps) after completing a blood meal. *D. S. Bertram*

PHIPPS, J. **Some Ecological Aspects of Anopheline Breeding in the Northern Coastal Area of Tanganyika.** *East African Med. J.* 1951, Sept., v. 28, No. 9, 341–53. [14 refs.]

Observations were made between October 1949 and September 1950 on breeding places of *Anopheles* near Muheza, Tanganyika, which lies about 25 miles inland from the coast and at 600 feet above sea-level at the foot of the Usambara Mountains.

Three main types of breeding place were recognized ; *viz.* seasonally flooded wide valleys used for rice cultivation ; streams, often dried up in the dry season ; and wells. Details are given in a table of the characteristics of 13 breeding places studied. The period of the observations followed the abnormally poor rains of April–June and October–November 1949. Mosquito breeding was greatly restricted as a consequence until the rains of April 1950. *A. funestus*, *A. gambiae* and *A. coustani* were present in stream breeding places in late 1949, before the streams dried up. *A. gambiae* was first to reappear in the river courses after the rains of 1950 and *A. funestus* and *A. coustani* progressively appeared and replaced *gambiae* by May and June. *A. gambiae* was more frequently the species found in wells.

Comparison is made of the percentage survival of different larval stages of *gambiae* from six of the breeding places. It is found that higher survivals occur if the original number of larvae is low. This relationship is not accepted as a single overcrowding effect, but it is suggested that it is a result of density-dependent factors in natural control. Percentage survivals of different stages were also highest for breeding places in the valleys and lowest in the wells.

The duration of different immature stages of *A. gambiae* in nature during July and August is estimated as follows : 1st larva, 1–2 days ; 2nd larva, 2–3 days ; 3rd larva, 1 day ; 4th larva, 2–3 days ; pupa, 1–2 days ; total 7–11 days.

Account is taken of other animal organisms frequenting the breeding places. Many of these were observed under laboratory conditions and offered mosquito larvae (mainly *Culex* but some *Anopheles* larvae also) as food. The habits of the predators are briefly outlined and their efficiency in destroying mosquito larvae is discussed. The water-tortoise, *Pelusios sinuatus*, ate larvae voraciously and was found to be responsible in one well for preventing *A. gambiae* larvae from surviving to the 3rd instar. Other competent predators were nymphs of dragonfly, belostomid and notonectid bugs. The author stresses the fact that the relative abundance of these different predators is of great importance in the success of natural control, and it is to this relationship of host numbers and predator numbers that he applies the concept of density-dependent factors. The discussion of this concept is in very general terms.

Temperatures of breeding places usually fell within the range 23°C. to 29°C., but was as high as 37·5°C. to 39°C. according to the depth of the water in a shallow stream.

Chemical and botanical characteristics of several breeding places are recorded in tables. There is no evidence of an association between mosquito breeding and plant life; *p*H values fall within 6·9 and 7·7; chloride salinity of 48·1/100,000 parts was consistent with the presence of *A. gambiae*, although mortality was high. There is some difference in the oxygen content for wells suitable and unsuitable for mosquito breeding but no association of breeding with any other chemical characteristics was detected. *D. S. Bertram*

HUSSAIN, M. Z. Y. **The Vectors of Malaria and Malaria Transmission in Pakistan.** *Pakistan J. of Health.* 1951, July, v. 1, No. 2, 69–71.

In West Pakistan malaria transmission is positively related to rainfall. *Anopheles culicifacies* is the main vector and is widely distributed. *A. superpictus* is found chiefly in Baluchistan and in some parts of the North-West Province. *A. stephensi* is suspected, though no positive reports have been received since August 1947, and more than 10,000 dissections have proved negative. It is thought that if an epidemic is started by *A. culicifacies*, *A. stephensi* may be able to keep it going or may even be able to start one if conditions are suitable. Nevertheless, it seems that these three species are not specially attracted to human dwellings or to human blood.

In East Pakistan conditions are different. Here, the greater the rainfall and the flooding and the higher the subsoil water-level, the lower the incidence of malaria. The anophelines here are: *A. philippinensis*, the vector in the deltaic plains of Bengal; *A. minimus*, the vector in the hill areas; and *A. sundaicus*, the vector near the sea and salt lakes. These species do prefer human blood and dwellings and their natural infectivity rates are higher than those in the West. The people sleep indoors and there is therefore greater contact between mosquitos and people.

There remains to be solved the problem of the hyperendemic conditions and the fulminating five-year epidemics in the West. *H. S. Leeson*

MCARTHUR, J. **The Importance of Borneo Anopheles. A Study of the relative Importance of the Different Species of Borneo Anopheles, from Records of 24,000 Dissections and other Evidence, by Observers throughout North Borneo and Labuan, Sarawak, Brunei and Dutch Borneo, 1914–49.** *Indian J. Malariology.* 1950, Dec., v. 4, No. 4, 391–447, 2 charts. [Numerous refs.]

As this paper is a summary in itself, it is not easy to summarize still further. It is based on an examination of the literature of the first half of the twentieth

century. The species of *Anopheles* considered are : *leucosphyrus*, the *umbrosus* group, *sundaicus*, *baezai*, *separatus*, the *hyrcanus* group, *barbirostris*, *tessellatus*, *minimus* var. *flavirostris*—all of which have been found infected—and *philippinensis*, *kochi*, *karwari* and *maculatus*—which have not. It is thought that a fairly complete picture is presented of the situation as at present known. The actual or suspected vectors are dealt with individually and the conclusions are that *A. leucosphyrus* is the chief vector throughout the greater part of the country ; that *A. maculatus* is probably of no importance ; that the *umbrosus* group is of considerable importance in some areas ; that *A. sundaicus* may be important in occasional epidemics and that *A. baezai*, *A. separatus* and the *hyrcanus* group are possible vectors but their importance is not well defined. *A. philippinensis* and *A. kochi* have normally no place in transmission in Borneo.

The references and records of distribution and dissections occupy more than 20 pages. *H. S. Leeson*

Tseng Sheng & Wu, I. **An Ecological Study of Mosquitos in Wuhan Area.** *Bull. Entom. Res.* 1951, Nov., v. 42, Pt. 3, 527–33.

The Wuhan area on the alluvial Yangtze plains of central China is about 150 feet above sea level with a number of abrupt hill ranges not exceeding 300 feet high. All but two of the ranges are treeless. Hill-streams, lakes, lotus ponds and seasonal ponds, especially if polluted, provide mosquito breeding places.

The following species of mosquito are recorded : *Anopheles hyrcanus* var. *sinensis* ; *Armigeres obturbans* ; *Mansonia uniformis* ; *Aëdes albopictus* ; *Culex fuscanus* ; *Culex tritaeniorhynchus* ; *Culex pipiens* ; and *Culex fatigans* and *Culex vagans*.

The rainy season occurs in June and July. *Culex fatigans* and *Armigeres* were common in June, the latter remaining abundant through the autumn until the winter frosts. *M. uniformis* and *Aëdes albopictus* were plentiful during August and September. *C. tritaeniorhynchus* was breeding extensively in bomb craters in October. *Culex pipiens* is noted as a wintering adult, and as biting man early in March at room temperatures of 70°F.

Anopheline breeding was most extensive during August to October. Some notes are given on the biology and habits of *A. hyrcanus* var. *sinensis*, *M. uniformis*, *Armigeres obturbans*, *Aëdes albopictus*, *C. fuscanus*, *C. tritaeniorhynchus*, *C. fatigans* and *C. pipiens* (var. *pallens*).

It is concluded that, in the absence of any other anopheline, *A. hyrcanus* is the vector of malaria in the area. *P. vivax*, *P. falciparum* and *P. malariae* are recorded in hospital data for 1947. Its rôle as a filarial vector elsewhere in China is noted ; one case of elephantiasis (but no parasitaemia) is given in the hospital records of 1947. Hospital records of " Japanese malaria " during Japanese occupation of the area are cited as possibly dengue, transmitted by *A. albopictus*.

No association with transmission of disease is noted for the area for *Armigeres obturbans*, *C. fuscanus*, *C. tritaeniorhynchus*, *C. fatigans*, *C. pipiens* or *M. uniformis*, all of which have been reported as biting man voraciously.

Samples of water from a rice-field, a jar, a pond, and a pool were analysed chemically. No mosquitoes bred in the pool ; its organic and mineral content was low. These characteristics, and dissolved oxygen values, were by far the highest in the breeding places of *Armigeres obturbans*. Various other features of breeding places of one or other species of the mosquito fauna of the area are briefly noted. *D. S. Bertram*

Curcio, R. & Polosa, P. Studio citomorfologico midollare in soggetti paralitici progressivi malarioterapizzati. [**Study of the Bone Marrow in Cases of General Paralysis treated with Malaria**] *Acta Med. Italica.* 1951, Apr., v. 6, No. 4, 89–93. English summary (8 lines). [18 refs.]

The cells of the bone marrow have been studied in 14 cases of G.P.I. before these were subjected to malaria therapy and again 1–2 months after the last attack of fever resulting from the treatment. Inoculation, with *P. vivax*, was given by various means, namely, intramuscular and intravenous injections and mosquito bites. Infection with malaria was demonstrated in every case and the number of febrile paroxysms varied. In 8 cases the parasites were demonstrated by both blood and bone marrow punctures a month or more after the last attack of fever.

Following treatment with malaria in the 14 subjects, there was found (i) a relative increase of the number of erythroblasts, (ii) relatively fewer granuloblasts, with evidence of some acceleration of maturing, (iii) relatively fewer leucoblasts, and (iv) a substantial increase in the number of reticulocytes and histiocytes. This proliferation and accelerated maturing of the erythroblasts, due to increased destruction of red blood corpuscles, is the same reaction as is found in ordinary cases of malaria. *J. Cauchi*

van Oye, E. & Charles, P. Contribution à l'étude de la fonction hépatique chez le noir africain. III. La bilirubinémie. [**Study of the Hepatic Function in Africans. III. Bilirubinaemia**] *Ann. Soc. Belge de Méd. Trop.* 1951, Aug. 31, v. 31, No. 4, 501–6.

Total bilirubin was determined in 150 infants and indirect bilirubin in 208 children and 353 adults, natives of Central Africa. The bilirubin function of the liver is, on the whole, favourable, but there is a tendency towards enhanced bilirubin values in the older Africans. This phenomenon is attributed to chronic malaria. *J. H. Birkinshaw*

Eddleman, E. E., Jr., Hale, W. H. & Snowden, W. M. **Vivax Malaria with Long Incubation Periods. Report of Seven Cases.** *U.S. Armed Forces Med. J.* 1951, Nov., v. 2, No. 11, 1693–8. [15 refs.]

Case reports are presented in respect of 7 patients, all of whom developed attacks of *P. vivax* malaria during the period May to July 1951 after their return from service in Korea to a part of the U.S.A. (California) where malaria is not endemic. Only one of these patients had a history of a previous malarial attack, and this occurred in 1944 and had been followed by no relapses.

All the men had served in Korea during the late summer and autumn of 1950 and had returned to the U.S. at various periods between January and April 1951. Five of them had been on suppressive chloroquine during some part of their sojourn in Korea, but two had not received any suppressive drug. The primary attacks occurred 2½ months (3 cases), 3 months (1 case), 3½ months (1 case), 5 months (1 case) and 8 months (1 case) after return from Korea. The Korean winter is too severe to permit transmission of malaria and it is practically certain that all the infections were incurred during the late summer and winter of 1950, which puts the incubation period at from 8 to 10 months.

[These findings are in harmony with those relating to indigenous *P. vivax* malaria occurring in Rumania, Italy, Spain, Holland and England, to the so-called Madagascar strain used in malaria therapy in England and to the St. Elizabeth strain used for malaria therapy in the United States, but not to the Chesson strain originating in the South-West Pacific, in which protracted incubation periods and long-term latency have never been recorded.] *G. Covell*

Winckel, C. W. F. & Ployé, M. A propos des sels de quinine solubles et insolubles destinés à l'usage oral. [**Observations on Soluble and Insoluble Quinine Salts for Oral Use**] *Rev. Paludisme et Méd. Trop.* 1951, Nov. 15, v. 9, No. 90, 256–64. [13 refs.]

Vila Coro, A. Die Behandlung der Malaria tropica in Äquatorial-Westafrika mit " Resochin ". [**Treatment of Subtertian Malaria in Equatorial West Africa with Resochin (Chloroquine)**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, Oct., v. 3, No. 2, 158–68.

These observations have been carried out at the Catholic Mission in Nkuefulan Bata, Spanish Guinea, 1–2° North of the Equator. It is tropical country with numerous small hills of 200–800 m. in height, where during the rainy season numerous streams and rivulets form. During the dry rainless period these become converted into swamps and a severe endemic tropical malaria arises that causes serious clinical symptoms particularly in children. The density of infection in the immediate vicinity of the Mission station is very great. In the Mission orphans' home the children develop malaria relapses 6–9 times every year. It therefore appears that effective immunity against *P. falciparum* takes, in these people, many years to become established. In this area malaria is the main cause of infant mortality.

Treatment should therefore be directed towards increasing the development of immunity, particularly in children, by permitting clinical manifestations to develop, but to hold them in check so as not to endanger the patient's life. It is therefore necessary to possess a drug which can achieve this in the shortest possible time.

Courses of drugs extending over a long time are impracticable. In the author's hands Resochin [chloroquine] proved to be an excellent remedy for overcoming the severe symptoms of subtertian malaria. After application of Resochin in an 18-hour course (in 109 cases) it was found that the total quantity of the drug necessary for a clinical cure could be administered in one dose.

The doses used were as follows :—

Adults	6	tablets (0·25 gm. each)
Children from 10–12 years... ...	5	tablets
Children from 6–9 years	4	tablets
Children from 2–5 years	3	tablets
Children from 1–2 years	2	tablets
Children under 1 year	1½	tablets

Although the quantity of Resochin administered in the single dose treatment amounted to only two-thirds of the total quantity originally used in the first scheme, the degree of success was practically the same.

Outstanding symptoms such as fever, headache, nausea and diarrhoea vanished within 24 hours.

The shrinkage of the spleen was rapid.

Side-effects were slight. In some cases abdominal pains were observed and the drug should not be given on an empty stomach. These pains are well controlled by benzyl benzoate, extract of belladonna, or by luminal.

The single-dose method has the following advantages :—

1. The rapidity with which clinical symptoms disappear.
2. Economy in use which permits application on the broadest basis.
3. Convenient method of application, especially important in an uncultured and primitive people.
4. The tolerance of the drug by children and adults.

Philip Manson-Bahr

WALLACE, R. B. **Malaria Therapy with Camoquin. (Single Dose.)** *Med. J. Malaya.* 1951, Sept., v. 6, No. 1, 24–31.

One hundred malaria patients from the labour force of a rubber estate in Malaya were treated with a single dose [3 tablets, amount not stated] of Camoquin during the period 5/7/50 to 30/1/51. In 84 cases the species of parasite found was *Plasmodium falciparum*, in the remaining 16 *P. vivax*. The population concerned had been subjected to malarial infection for many years and thus possessed a considerable degree of tolerance. Only 16 per cent. of the patients had pyrexia on the second day and only 3 per cent. on the third. Parasites were observed in the peripheral blood in 26 per cent. of the cases on the second day and 3 per cent. on the third. No relapses were reported up to the end of the year, but the author notes that some of the labourers may have relapsed but have continued to work.

The cost of each treatment with Camoquin for the series reported on was 85 cents (since risen to 1·14 Straits dollars), as against 12·30 cents for a mepacrine course of 3 tablets daily for 5 days. This, however, is offset by the saving of days in hospital effected by a single dose treatment. Thus 2 to 3 days in hospital on "single dose" Camoquin followed by mass suppression with proguanil [or mepacrine or chloroquine] would result in a considerable saving to the employer, on present recognized treatments and with the present price of rubber.

[It seems possible that with a semi-immune population such as that reported on, a single-day treatment with mepacrine (5 or 6 tablets) followed by mass suppression might prove equally effective. It would certainly be much less costly.] *G. Covell*

BOURDIN, J. L. Essais de traitement et de prophylaxie du paludisme aux Nouvelles Hébrides par la Nivaquine (3 377 R.P.). [**Trials of Nivaquine in the Treatment and Prevention of Malaria in the New Hebrides**] *Méd. Trop.* Marseilles. 1951, May–June, v. 11, No. 3, 481–5.

During the months of October, November and December 1949, therapeutic and prophylactic trials with nivaquine [=chloroquine] were carried out in Espiritu-Santo (New Hebrides). Fifty hospital patients (37 *P. falciparum*, 10 *P. vivax* and 3 mixed infections) were treated as under :—

Adults : Two tablets of 0·10 gm. thrice daily for 3 days.
Two tablets of 0·10 gm. twice daily for 2 days.
One tablet of 0·10 gm. twice daily on the 6th day.

Children : Aged 6 to 12 years one half the above dosage.
Aged 1 to 6 years one-third the above dosage.

Temperatures fell to normal on an average 40 hours after the commencement of treatment, usually somewhat earlier in *falciparum* than in *vivax* cases. There was rapid alleviation of all other clinical symptoms. Asexual parasites were no longer seen in blood smears on an average after 50 hours in *falciparum* and 72 hours in *vivax* cases. There was no apparent effect on gametocytes. Radical cure was effected in all the *falciparum* cases. In the *vivax* cases it was thought that the relapses were rendered less frequent, less intense and more widely spaced as the result of some inhibitory action of the drug on the exo-erythrocytic stage of the parasite. [It is doubtful whether such a conclusion is justified from so limited a series.]

Prophylactic tests were carried out on 55 New Hebridean labourers, each of whom received 0·30 gm. of the drug on one day of the week over a 3-month period. Only one of these experienced an overt malarial attack, whereas in a

comparison group of 100 labourers there were 32 cases. Twenty-three newly arrived Europeans, none of whom had previously suffered from malaria, were each given 0·10 gm. of nivaquine daily over a period of 6 months. Thirty-six others who had previously suffered from malaria received the same dosage for 2 months. There were no overt malarial attacks in either group while under drug prophylaxis. Out of 991 other Europeans, not on drug prophylaxis, 284 (35 per cent.) experienced overt attacks of malaria. The author concludes that nivaquine is an excellent drug both for the treatment and the prophylaxis of malaria in the New Hebrides. *G. Covell*

CANET, J. Traitement de l'accès palustre infantile par les suppositoires de Nivaquine. [**Treatment of Malaria Attacks in Children with Suppositories of Nivaquine**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 481–7.

Forty Vietnam children aged from 3 months to 11 years, suffering from acute attacks of *P. falciparum* malaria, were treated with suppositories containing either 0·15 or 0·30 gm. nivaquine base. Satisfactory results were obtained, comparable to those obtained by oral administration. Fever had disappeared on the 2nd or 3rd day and parasites had disappeared from the blood in 80 per cent. of the cases by the 3rd to the 5th day. This may be a valuable method of treatment in cases in which oral administration is contraindicated.

As a result of the trial the author recommends the following dosages :—

Children aged	
0–1 year	One sup. 0·15 gm. a day for 5 days.
1–3 years	Two sup. 0·15 gm. a day for 2 days ; one 0·15 gm. on each of 3 following days.
3–6 ,,	One sup. 0·30 gm. and one 0·15 gm. on each of first two days ; two 0·15 gm. on each of 3 following days.
6–10 ,,	Two sup. 0·30 gm. a day for two days ; one 0·30 and one 0·15 gm. on 3rd and 4th days ; one 0·30 gm. on fifth day.
10 plus	Two sup. 0·30 gm. a day for 3 days ; one 0·30 and one 0·15 gm. on each of the 4th and 5th days.

Norman White

NOR EL-DIN, G. **Recent Views in Treatment of Malaria. A Trial of a New Drug (Abadol).** *J. Roy. Egyptian Med. Ass.* 1951, v. 34, No. 8, 559–63.

Twenty-two cases of *P. vivax* and 7 cases of *P. falciparum* malaria were treated with Abadol (amino-2-thiazole), which is said to possess a powerful antithyroid action. It was thought that the drug might affect the oxygen consumption of the malaria parasite, or affect some enzyme system essential for its metabolism in the same way as sulphanilamide acts on *Plasmodium knowlesi*. The usual dosage was 0·6 gm. followed by two tablets (0·1 gm.) three times on the first day, and 2 tablets 4 times daily on each of the next 5 days.

In most of the cases treated fever subsided within 2 to 3 days. In 17 of the *P. vivax* cases asexual parasites disappeared from the peripheral blood on an average in 2 to 4 days. In the remaining 5 cases both parasites and fever persisted for 5 days or more. In the *P. falciparum* cases the drug appeared to be less effective, the average time of disappearance of the asexual parasites being 3 to 5 days. Leucopenia was observed in one case after a 5-day course. Other complications noted were drug fever, erythema, urticaria, lumbar pain and oliguria.

The author notes that the action of Abadol is less rapid than that of Aralen [chloroquine] as reported by HALAWANI and his colleagues in the treatment of malaria in Egypt [this *Bulletin*, 1947, v. 44, 792]. He concludes, however,

that it possesses definite anti-malarial activity and suggests that possibly some modification in its formula may render it more effective.

[From the above account it does not seem likely that this drug will prove of practical value in the treatment of malaria.] *G. Covell*

Ruiz Sanchez, F., Paredes E., M., Casillas, Josefina & Riebeling, Q. B. Rebeca. Dos casos de paludismo tratados con cloranfenicol. [**Two Cases of Malaria Treated with Chloramphenicol**] *Medicina*. Mexico. 1951, Oct. 25, v. 31, No. 638, 416–17, 2 figs.

Mandoul, R. & Jacquemin, P. Assainissement de l'oasis palustre de Ouargla (sud constantinois). [**Health Reclamation of the Malarious Oasis, Ouargla**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 467–81, 3 text figs. & 4 figs. on 2 pls. [16 refs.]

Ouargla is the largest oasis in the Algerian Sahara and is the capital of the Oases Territory. It has a settled population of 16,000 to 18,000. An anti-malaria campaign was started there in February 1949. Ouargla was highly malarious. All three species of malaria parasite were prevalent, *P. falciparum* predominating. The Melano-Berber and Arab inhabitants live in narrow winding lanes in the town of Ouargla or in scattered villages in the palm-groves. The dwellings crowded together are difficult of access and shelter mules, goats, dogs, chickens and donkeys as well as their human occupants. The houses are constructed of sun-dried bricks. The inner walls are often soot-covered ; there are no chimneys. From June to October many families move to palm-leaf huts in the palm-groves where they stay till the end of the date harvest.

The only malaria vector is *Anopheles multicolor*. This species can breed in water with a saline content up to 86 gm. of chlorides to the litre. Larvae can be found in all months of the year, a few even in January when the night temperature may fall to freezing point. It is a house-haunting mosquito and feeds on man or animals with impartiality. It may transmit malaria in any month of the year. Its breeding places are found all along the irrigation system which includes several hundred wells and more than 100 kilometres of irrigation channels and drains. The water drains to a marsh in the low-lying portion of the oasis where the water is too salt to permit anopheline breeding.

The energetic anti-malaria measures started in 1949 have included : the spraying of dwellings with a DDT and BCH mixture ; the reduction in the number of breeding places by filling and by repairs to water channels ; stocking breeding places with *Gambusia* which have thrived and rendered great service ; the spraying of breeding places not amenable to any of the above measures with a DDT larvicide ; and the distribution of synthetic prophylactics to the child population. Both paludrine and chloroquine have been used with success. All these measures are described in detail.

The results have been spectacular. In October 1948 the spleen rate of children was 25 per cent. The rate fell steadily till October–November 1950 when the spleen rate of 2,080 children examined was but 2·4 per cent. Formerly some 5 to 6 thousand cases of malaria were treated annually in the communal dispensary : in 1950 there were only 236 patients with symptoms of malaria and of these only 40 were found to harbour malaria parasites. The latter number included some nomads. No primary infection occurred among the military garrison (some 500 men) in 1950. Malaria is now responsible for no more than 3 per cent. of dispensary consultations. *A. multicolor* can no longer be found. But continued vigilance will be necessary : nomads will continue to import infection. *Norman White*

DOWLING, M. A. C. **An Experiment in the Eradication of Malaria in Mauritius.** *Bull. World Health Organization.* Geneva. 1951, v. 4, No. 3, 443–61, 5 figs.

About 1860, *Anopheles* mosquitoes were imported into Mauritius, an island in the Indian Ocean 500 miles east of Madagascar on latitude 20° South. The climate is sub-tropical, with rainfall varying between 25 and 200 inches according to locality. A flat coastal plain rises steeply to a central plateau of 1,000–1,800 feet where lives the majority of the white community. A population of 460,000, mainly Indian, is associated with a major industry of sugar planting. An anti-malarial programme instituted during the war years rendered the plateau and Port Louis relatively free from malaria by 1948. A British Research team sponsored by the Government of Mauritius then commenced the creation of an organization designed to eliminate malaria from the island. The vector mosquitoes are *A. gambiae* and *A. funestus*.

The basis of the campaign was the indoor spraying with insecticides of every building likely to harbour mosquitoes. This paper gives details of the organization, methods of application, methods of checking the application, malariometric data before and at intervals during the progress of the campaign, and the relevant entomological data. Three formulations of insecticide were used in 3 different zones, namely DDT in kerosene around Port Louis, DDT wettable powder on the coastal plain around the southern three-quarters of the island and BHC wettable powder on the coastal plain in the north ; the central plateau was not treated. Standard 5 per cent. mixtures were applied to give a surface deposition of 100 to 150 mgm. of DDT or BHC per square foot. Usage of BHC for the year 1949 showed that for 6 weeks after application it was remarkably effective on mud and dung wall surfaces, more so than DDT ; but its residual capacity was inferior and according to the chemical tests used the concentration of the wall deposit was halved at the 9th week, whereas there was no loss of deposit of DDT at the 22nd week and indeed it endured for as long as 10 to 12 months. [Chemical tests for BHC are not recorded after the 9th week.] Biological tests are to be done to confirm these observations. Corrosion of apparatus and costs of re-spraying at the 9th week and other factors led to the replacement of BHC by DDT wettable powder.

The " more severe " vector *A. funestus*, previously very common, has not been seen in adult or larval form since June 1949 ; similarly *Aëdes aegypti* has vanished. Not so *A. gambiae*, which has been found breeding throughout the coastal zone, though the numbers of adults, according to catching stations, have fallen by 97 per cent. ; unsprayed new houses and cowsheds harbour them in large numbers. Because of this evasion of lethal surfaces by *A. gambiae* and because of the limitation of permanent breeding places in the winter quarter it was decided to institute in addition anti-larval measures with DDT in oil of high spreading quality, covering in the first instance a suitable experimental area. If successful, the scheme would be extended to the rest of the coastal plain.

Malariometric data in 1950 showed a reduction in spleen rate to 2·8 from the original 34·8, in parasite rate from 9·5 to 0·36, in spleen size, parasite intensity and in proportion of *Plasmodium falciparum* ; the average parasite rate in children born after the initial spraying was 0·27. Malaria morbidity figures have fallen and a noticeable effect is evident in the general death rate (28·0 to 14·7) and infant mortality rate (150 to 91).

[It is perhaps unfortunate that it was not considered possible to increase the frequency of spraying with BHC to determine the comparable results on the numbers of *A. gambiae* larvae in that zone ; it is conceivable that anti-larval measures may prove to have been unnecessary.] *R. Ford Tredre*

KAR, P. K. **Malaria Control in Assam.** [Abstract.] *Indian J. Malariology.* 1950, Sept., v. 4, No. 3, 385–7.

In 1946, DDT residual spraying was started in highly malarious areas of Assam where *Anopheles minimus* is the chief vector. All human dwellings and cattle-sheds were sprayed with a 2·5 per cent. DDT suspension, 50 mgm. DDT per square foot of surface. The epidemiological data contained in two tables are insufficient to justify definite conclusions but the author states that since the commencement of spraying the incidence of malaria has decreased by 50 per cent. and that there has been a marked decrease in the incidence of other diseases as well. *Norman White*

KELLER, J. C., DAVIS, A. N. & MOONEY, C. I. **Toxicity of Several Organic Insecticides to Anopheline Larvae.** *Mosquito News.* 1951, Sept., v. 11, No. 3, 171–4.

Laboratory tests of a number of new insecticides with the use of fourth instar *Anopheles quadrimaculatus* are described, in which acetone solutions of each substance were introduced into beakers of water to give the required concentration. DDT at 0·0021 p.p.m. gave a 50 per cent. kill. Parathion and dieldrin were three times as toxic as this, while toxaphene and chlordane were slightly less so. Lindane, heptachlor, aldrin and Dilan were the least toxic of the substances tried.

Field experiments were conducted on plots 200–1,000 sq. ft. containing drainage ditches in which the larval population consisted of all stages of *A. quadrimaculatus* and *A. crucians*. All insecticides were tested at several dosages both in oil solutions and emulsions, and the effectiveness was assessed by differences in larval counts after 24 hours. The most toxic substance was dieldrin, followed by heptachlor, DDT and parathion of almost equal toxicity. Toxaphene, aldrin, chlordane and lindane were much less effective. All the substances were more effective as emulsions than oil solutions. DDT gave 96 per cent. kill with emulsion at 0·006 pound per acre and 79 per cent. with oil solution. The kills for dieldrin were 98 and 92 per cent. and toxaphene 84 and 62 per cent. respectively. Comparisons between the results in the laboratory and field experiments showed parathion to be more toxic in the former and heptachlor in the latter, whereas the others showed no difference.
Ruth Nash

REID, J. A. **Effects of DDT upon different Species of Mosquitoes in Malaya.** *Nature.* 1951, Nov. 17, 863–5. [10 refs.]

Earlier work by WHARTON and REID [this *Bulletin*, 1950, v. 47, 321 ; WHARTON, *ibid.*, 1951, v. 48, 1077] has shown a great difference in the reactions of *Anopheles maculatus* and *Culex fatigans* to wall surfaces treated with DDT. A hut treated with 200 mgm. DDT per sq. ft. kills over 50 per cent. of *A. maculatus* entering it for six months ; but the same dose scarcely kills any *C. fatigans*, even when fresh, though it does drive them out and prevents many from biting. Further work, with the same trap huts, has shown that there is a considerable range of susceptibility to DDT among species of mosquitoes. Judging by the mortalities of mosquitoes caught in the window trap and held for 24 hours, the most susceptible was *A. maculatus* followed by *A. umbrosus* and *Mansonia* spp. *Anopheles barbirostris* and *A. sundaicus* were intermediate while *A. letifer* was rather resistant. Finally, *Culex vishnui* suffered almost as little as *C. fatigans*.

It was observed that the biting rate of the anophelines and of *Mansonia* spp. was very little depressed by the DDT, probably because of the fact that they fly straight to the host. On the other hand, the two species of *Culex* are likely to rest on the walls before biting and it is probably this which enables the DDT to reduce the biting rate by about 70 per cent. The author stresses the value of trap hut experiments for determining the effects of insecticidal residues on various types of wild mosquitoes. *J. R. Busvine*

Floch, H. Lutte antiamarile et lutte antipaludique en Guyane française. Quelques résultats enregistrés à ce jour. [**Current Results of Control Measures against Yellow Fever and Malaria in French Guiana**] *Arch. Inst. Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 234.* 1951, July, 12 pp., 6 figs.

A programme of residual sprayings with DDT of houses and premises in French Guiana to destroy *Anopheles darlingi*, *Aëdes aegypti* and *Culex fatigans* was begun in 1949 and repeated in 1950 [this *Bulletin*, 1951, v. 48, 617]. The present paper reports on a third application in which Gammexane (P.520) was also used but only for resting places other than dwellings. This third campaign included spraying in remoter districts inland for the first time. The reduction in malarial incidence noted after the first two sprayings is further confirmed. An increase of birth rate over mortality rate is now claimed in the territory.

In Cayenne itself, considerable numbers of *C. fatigans* persisted in some parts of the town after the earlier treatments. Breeding places in stagnant water and liquid manure used for watering gardens were then treated with water dispersions of Gammexane P.520 and the larvae destroyed. Despite this, the numbers of adults increased. Subsequently, additional breeding places were detected in stagnant sewers and treatment of these with Gammexane P.520 in dust form effected a complete reduction of the adult population of *C. fatigans*. *D. S. Bertram*

Garnham, P. C. C. **The Mosquito Transmission of *Plasmodium inui* Halberstaedter and Prowazek, and its Pre-Erythrocytic Development in the Liver of the Rhesus Monkey.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Aug., v. 45, No. 1, 45–52, 15 figs. on 3 pls. [12 refs.]

A description is given of the sexual part of the life-cycle and pre-erythrocytic development of *Plasmodium inui*, the quartan parasite of macaque monkeys. Since normally this parasite produces in monkeys a chronic infection with low parasitaemia, the experimental animals were splenectomized. This operation brings about a heavy infection, with a maximum number of gametocytes 2 weeks later, after which the monkey soon succumbs to the infection.

After trials with different species of *Anopheles*, it was found that *A. maculipennis atroparvus* was the most suitable vector. Out of several hundred of these mosquitoes fed on an infected splenectomized *Macaca mulatta*, more than half became infected, the complete development of the parasite taking over 3 weeks at 25°C. As in the case of the human quartan parasite, the oöcysts of *P. inui* grew slowly, reaching 8 μ in diameter on the 6th day, and 22 μ on the 14th. By the 3rd week sporozoites appeared in the oöcysts, and 2 days later in the salivary glands.

For the study of the early development of *P. inui* in the vertebrate host, over 300 infected mosquitoes were allowed to bite a small monkey, and on the following day a suspension of salivary glands from about 400 mosquitoes

was inoculated into it intravenously. Pieces of liver were taken from the monkey by biopsy, and sections were fixed in Carnoy's fluid or formol saline and stained by Giemsa's method. These preparations revealed 4 stages of pre-erythrocytic schizogony, corresponding to 7, 8, 11 and 12 days' growth respectively, while the blood forms of the parasites were first detected 12 days after the initial inoculation of sporozoites. The pre-erythrocytic schizonts—which are described in detail and illustrated by a series of photomicrographs—occurred in the parenchyma cells of the liver. The earliest stage measured 5·5 μ in diameter and contained 5 nuclei; the mature form was about 22 μ with upwards of 2,000 merozoites. The final stages are characterized by the formation in the schizont of discrete subdivisions of the cytoplasm resembling cytomeres. *C. A. Hoare*

Schmidt, L. H. & Squires, Wanda L. **The Influence of Cortisone on Primate Malaria.** *J. Exper. Med.* 1951, Dec. 1, v. 94, No. 6, 501–20, 4 text figs. & 14 figs. on 4 pls. [49 refs.]

"Studies have been made of the effects of cortisone on the course of primary and developed infections with *P. cynomolgi* in the *rhesus* monkey. This investigation has shown that repetitive administration of the hormone in daily doses of 10 mg. per kg. during the primary attack produced striking intensification of the peripheral blood infection during the postcrisis phases of the disease. Similar administration of 10 or 50 mg. per kg. doses of the hormone during the chronic or latent stages of the infection provoked recrudescences of remarkable severity. In both early and late infections the responses induced by cortisone treatment corresponded closely to the reactions to splenectomy.

"Collateral studies have shown that the doses of cortisone which produced the reactions described above also evoked a lymphopenia, marked reductions in the sizes of the axillary and inguinal lymph nodes and spleen, and striking histological changes in the latter organ. These changes involved severe regression or exhaustion of lymphoid elements in both splenic nodules and pulp with almost complete obliteration of proliferative activities involved in the production of macrophages from lymphocytes. Indications are that the resulting reduction in supply of macrophages, rather than inhibition of phagocytic activity *per se*, was responsible for the intensification of the disease produced by cortisone."

Deschiens, R. & Lamy, L. Infection expérimentale du lapin par *Plasmodium berghei*, Vincke et Lips 1948. [**Experimental Infection of Rabbit with *Plasmodium berghei***] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 405–9, 4 figs. on 2 pls.

In view of the refractoriness of adult rabbits and guineapigs to infection with *Plasmodium berghei*, the authors carried out experimental infections of new-born rabbits with a strain of this parasite which killed mice in 10–15 days. Out of 15 rabbits, inoculated intraperitoneally with 0·20–0·25 cc. of mouse blood, in which 30–50 per cent. of erythrocytes were infected, 8 acquired an infection, 5 were negative, while 2 died before they could be examined. The incubation period varied from 3 to 5 days, the infection killing the animals in 6–8 days. Morphologically, the parasites in new-born rabbits showed no special peculiarities. Attempts to infect 15-day-old and adult rabbits, as well as 6 new-born guineapigs, with 0·5 cc. of infected mouse blood were unsuccessful. *C. A. Hoare*

BLACK, R. H. **The Effect of Neoarsphenamine on *Plasmodium berghei* Infections in the Mouse and Rat : Inhibition of the Antimalarial Action of Neoarsphenamine by British Anti-Lewisite.** *Ann. Trop. Med. & Parasit.* 1951, Sept., v. 45, No. 2, 127–36, 10 figs. [40 refs.]

Plasmodium berghei has been maintained by the author in mice and rats by the intraperitoneal injection of infected blood. He notes that in mice the character of the infection has been maintained, but that in rats after 20 passages the character had changed with loss of virulence and lowered numbers of parasites. Because of the presence of *Bartonella muris* in rats after splenectomy noted during studies of immunity to *P. berghei* in these animals, neoarsphenamine was given and proved curative in very small doses. The effect of this substance on *P. berghei* has now been investigated. Drugs were administered subcutaneously. In mice a single dose of 100 mgm. neoarsphenamine per kgm. temporarily arrested the *P. berghei* infection and the minimum effective dose was determined to be 50 mgm. per kgm. of the arsenical given twice daily, a value similar to that for quinine (giving a quinine equivalent of one). The effect of the above dosage of neoarsphenamine was partly antagonized by BAL given a few minutes later. The activity of this substance alone on *P. berghei* is not accurately known. In rats similar experiments were made. It was found that a single (maximal) dose of 100 mgm. neoarsphenamine per kgm. did not markedly affect the development of *P. berghei*, nor did it act prophylactically. It may be recalled that many years ago this arsenical was shown to have some action on *P. vivax*. The possible mode of action of neoarsphenamine is discussed. *J. D. Fulton*

COFFIN, G. S. **Active Immunization of Birds against Malaria.** *J. Infect. Dis.* 1951, July–Aug., v. 89, No. 1, 1–7, 3 figs. [12 refs.]

For active immunization of birds, the author used *Plasmodium lophurae* in ducks and *P. gallinaceum* in chicks. For the preparation of the vaccine, parasites were obtained by bleeding heavily infected birds, using as an anticoagulant one part of 4 per cent. sodium citrate in saline to 9 parts of blood. Parasitized red cells were repeatedly washed by centrifuging and suspending in saline, after which they were kept overnight in 0·1 per cent. formaldehyde saline, and then washed 2–3 times in saline. Finally, the parasitized cells were mixed with the proprietary emulsifiers " Falba ", " Bayol F ", and killed dried tubercle bacilli. The vaccine was used on the day of preparation, with suitable controls.

Ducks inoculated twice, at an interval of 6 weeks, with 11 ml. of anti-*lophurae* vaccine containing 15×10^9 parasites, showed increased resistance to infection when challenged 16 weeks later by intravenous injection of 10^9 parasites (*P. lophurae*) per kgm. body-weight. Chickens immunized with 10 ml. anti-*lophurae* vaccine (13×10^9 parasites) developed some immunity against *P. lophurae* after 8 weeks. This immunity was strengthened 10 weeks after the birds had been re-vaccinated ($6{\cdot}6 \times 10^9$ parasites). When the same birds were challenged with *P. gallinaceum* 12 weeks after the last anti-*lophurae* vaccination, it was found that they were strongly resistant to infection with the heterologous parasite, as compared with controls. Increased resistance to infection with *P. gallinaceum* was also observed in chicks inoculated with normal chicken erythrocytes in a similar emulsion. This immunity may have been produced by immune iso-antibodies to chicken erythrocytes which vary in antigenic constitution. *C. A. Hoare*

COFFIN, G. S. **Passive Immunization of Birds against Malaria.** *J. Infect. Dis.* 1951, July–Aug., v. 89, No. 1, 8–15. [20 refs.]

For passive immunization against avian malaria the author used *Plasmodium lophurae* and *P. gallinaceum*, with ducks and chicks as hosts. Normal sera were obtained from uninfected ducks, while immune sera were prepared from ducks repeatedly infected with *P. lophurae*, the density of which reached 1,500–15,000 parasites per 10,000 erythrocytes after the 1st inoculation but became undetectable after re-inoculations. The blood, drawn 10 days after the last injection of parasites, was allowed to clot at room temperature, after which it was kept for at least 12 hours in a refrigerator, when the serum was poured off, centrifuged and stored.

It was found that immune serum (anti-*lophurae*) when given to ducklings at the time of inoculation with *P. lophurae* immunized them passively, as shown in the reduction of parasitaemia. When the blood of ducks infected with this parasite was placed in contact with homologous serum *in vitro*, it was rendered less infectious when inoculated to clean ducklings, resulting in a delay in the appearance of the parasites and lower density of parasitaemia. However, the protective action of immune serum induced *in vitro* was reduced after contact with lysed normal duck erythrocytes. It was also demonstrated that the latter were agglutinated by immune sera. Similarly, blood from chickens infected with *P. gallinaceum* lost some of its infectivity for clean chicks after having been in contact *in vitro* with immune serum from ducks infected with *P. lophurae*. *C. A. Hoare*

EYLES, D. E. **Studies on *Plasmodium gallinaceum*. I. Characteristics of the Infection in the Mosquito, *Aedes aegypti*.** *Amer. J. Hyg.* 1951, July, v. 54, No. 1, 101–12, 5 figs. [10 refs.]

This paper deals with the frequency distribution of the number of oöcysts in *Aëdes aegypti* infected with *Plasmodium gallinaceum*, and with the correlation of the oöcyst number to the number of gametocytes in chickens upon which the mosquitoes were fed. Experiments were made with chicks 4 to 12 weeks old, infected by subcutaneous inoculation of saline suspensions of sporozoite-containing salivary glands from 1–4 mosquitoes. Laboratory-bred mosquitoes were fed either directly on infected birds or—through sausage membranes—on their defibrinated blood. They were subsequently fed on apple slices and dissected for examination of oöcysts 5–9 days after the infective feeding. The degree of infection in the mosquito was determined by counting the number of oöcysts on the stomach, after staining with 0·5 per cent. mercurochrome.

This study was carried out by statistical methods, and the results are shown in a number of tables, curves and histograms. It is seen that the oöcyst number was markedly variable, the standard deviation varying from as large as the mean, when a few oöcysts were present, to about half as large, when many were present. The consistency of the relationship of mean and standard deviation is expressed in a curve correlating the coefficient of variation to the mean, which can be used for predicting the degree of variation at various intensities of infection. If sufficiently exposed to infection, all the mosquitoes used in the experiments proved to be susceptible to infection with *P. gallinaceum*, as shown by the fact that the proportion of infected mosquitoes approached 100 per cent. as the oöcyst count increased. The number of oöcysts was also correlated with the number of gametocytes present in the donor-chick. Thus, a gametocyte count of 10,000 per cmm. corresponded to an oöcyst count of 175 per gut, while 1,000 gametocytes produced about 17·5, the maximum number of oöcysts being 300 (20,000 gametocytes/cmm.).

It was observed that in sporozoite-induced infections of chicks the infectivity of gametocytes for mosquitoes did not decline at the height of parasitaemia as in the case of blood-induced infections [this *Bulletin*, 1947, v. 44, 31]. It was also noted that certain chickens were more infective to mosquitoes than others, though they did not differ in the numbers of gametocytes present. Owing to technical difficulties, the sporozoites could not be enumerated, but it was found that the numbers of sporozoites reaching the salivary glands were proportionate to the oöcyst number, and transmission was always successful.

C. A. Hoare

Seaton, D. R. **Failure to induce Chloroquine-Resistance in** *Plasmodium gallinaceum*. *Ann. Trop. Med. & Parasit.* 1951, Sept., v. 45, No. 2, 99–100.

Earlier work on the production of resistance to drugs in *P. gallinaceum* [this *Bulletin*, 1942, v. 39, 815 ; 1948, v. 45, 48, 1066 ; 1949, v. 46, 910] has indicated that the conditions necessary are an active infection treated with small doses of drug, and frequent passage into young hosts. The technique of Knoppers [*ibid.*, 1949, v. 46, 910] was followed by the present investigator in an attempt to produce chloroquine-resistance in *P. gallinaceum*. For this purpose week-old chicks were inoculated intravenously with 50 million parasites in 0·2 cc. volume, the nomogram of Williamson [*ibid.*, 118] being used for determining the necessary dilution. The drug in doses of 2·0 mgm. per kilo was given orally on the evening of inoculation and on mornings and evenings of the 3 subsequent days. One week after the first inoculation, the blood of a treated bird was used for infecting another host, while the experiments continued for 54 weeks. Resistance failed to develop. In his summary the author suggests that resistance to paludrine [proguanil] may develop because it interferes with one enzyme system in the parasite, whereas chloroquine may interfere with several.

J. D. Fulton

TRYPANOSOMIASIS

Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiase. No. 150/T. Léopoldville (Congo Belge). [No date.] 7 mimeographed pp. **International Scientific Committee for Trypanosomiasis Research. Final Report.** Third Session held at Bobo-Dioulasso, Haute-Volta, 11th to 16th June, 1951.

At the third Meeting of the International Scientific Committee for Trypanosomiasis Research held in Bobo-Dioulasso in June 1951, the following were among the matters raised and the conclusions reached :—

Bovine Trypanosomiasis.

Fiennes described his work on " cryptic " trypanosomiasis [see this *Bulletin*, 1951, v. 48, 963].

A preliminary report from the West African Institute for Trypanosomiasis Research described the greater tolerance to trypanosomiasis of a small indigenous breed of cattle, the Ndama, as compared with pure-bred Zebu or Zebu-Ndama cross-breds.

Encouraging results were claimed from Mozambique by the use of the dimethylsulphate of antrycide as a prophylactic agent in cattle exposed to the risk of natural infection from *G. morsitans*.

A general report on the present position regarding the use of antrycide salts and of dimidium bromide in treatment and in prophylaxis was prepared by a sub-committee appointed for the purpose [see below].

Field trials have been in progress in West Africa with new compounds of the phenanthridinium series [see BROWNLEE, GOSS, GOODWIN, WOODBINE and WALLS, this *Bulletin*, 1950, v. 47, 1070].

A new trypanocide of the cinnoline series (" 528 ") was described [see LOURIE, MORLEY, SIMPSON and WALKER, p. 250].

Entomology.

POTTS, who has been engaged in mapping the distribution of tsetse flies in Africa, exhibited the draft sheet of his map on a scale of 1 : 5,000,000 for Eastern Africa. Work on the Western and Central portions is well in hand. With the information already available it will be possible to follow up these maps by a further series on the larger scale of 1 : 2,000,000.

A report was presented on NASH's " resting haunt " technique for *Glossina* survey [see this *Bulletin*, 1950, v. 47, 718].

G. austeni is not only more widely spread in Portuguese East Africa than was previously known, but it must be regarded as an important vector of animal trypanosomiasis.

A small focus of *G. fusca* was eliminated in the Belgian Congo by means of donkeys sprayed with DDT. An experiment with smoke bombs against *G. palpalis* in the same territory showed that this method was probably too slow and irregular for wide application.

Human Trypanosomiasis.

It would be useful to study the possible influence of nutritional deficiencies on the evolution of sleeping sickness, its distribution and its epidemiology.

The difficulty of distinguishing between the lymphatico-blood and nervous stages of infection has been emphasized by recent comparative studies on spinal and cephalic fluids [see NEUJEAN, this *Bulletin*, 1951, v. 48, 956]. This gives further point to the need for a drug effective in all stages of the disease.

BRUTSAERT and HENRARD's technique of haemoculture, for which high hopes were expressed at the last meeting of this Committee [this *Bulletin*, 1951, v. 48, 338], has given disappointing results and only exceptionally enables the diagnosis to be made in cases where the usual methods have failed.

Mel B and Related Compounds.

Trials of the precursors of Mel B, namely melarsen and melarsen oxide, should again be taken up.

The trypanocidal power of Mel B and its ability to modify the cerebrospinal fluid have been confirmed, but toxicity precludes its use for mass treatment in bush practice. It would be worth investigating the value of a single injection of 3 to 4 mgm. per kgm. for the lymphatico-blood stage. For new cases in the nervous stage, treatment by 10 to 12 mgm. per kgm. spread over 3 daily injections seems optimal. Other schedules are either less active or too dangerous.

The following important recommendations were made :—

" (*a*) *Absolute* necessity of testing compounds for toxicity and therapeutic action in laboratory animals before any trials are made in man.

" (*b*) The protocols and results of these tests in laboratory animals should be available to all responsible organisations or workers in respect of each batch used. Those who use these drugs in man must carefully note the batch numbers of the preparations they use.

" (*c*) The responsible bodies in each country should make the preceding sections of this paragraph known to manufacturers interested in the preparation of trypanocides.

" (*d*) The Committee recommends the setting aside of standard preparations and establishing biological standardisation procedures for each of the melaminyl compounds as soon as possible."

Pentamidine and Lomidine.

These diamidines are not toxic in doses up to 5 mgm. per kgm. of the di-isethionate intramuscularly daily for 10 days. They continue to give excellent results in the lymphatico-blood stage of infection and they are the best chemoprophylactic agents now in use.

Confusion would be avoided by expressing the dosages of the diamidines in terms of base rather than of salt. One mgm. base is equivalent to the following :

1·21 mgm. dihydrochloride (*i.e.*, pentamidine)

1·74 mgm. di-isethionate (*i.e.*, pentamidine)

1·56 mgm. dimethanesulphonate (*i.e.*, lomidine).

E. M. Lourie

Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiase. No. 151/T. Léopoldville (Congo Belge). [No date.] 5 mimeographed pp. Appendix I. **International Scientific Committee for Trypanosomiasis Research. Report of the Sub-Committee appointed to Report upon the Treatment and Prophylaxis of Animal Trypanosomiasis with Antrycide and Dimidium Bromide.**

At the third session of the International Committee for Trypanosomiasis Research [see above] a sub-committee of veterinary officers drew up a report on the present position in regard to the use of antrycide and dimidium bromide. The following are some of the points made :—

Treatment.

In the recommended doses the cost of antrycide treatment is about 2½ times that of dimidium bromide, the recommended dosage of antrycide dimethylsulphate being 5 mgm. per kgm. of a 10 per cent. solution, and that of dimidium bromide not to exceed 1·5 mgm. per kgm. of a 3 per cent. solution prepared in boiling water. [Further expert opinion has since suggested that dimidium bromide is not only easier to prepare but is better tolerated locally in 1 per cent. solution ; and also that the dose should not exceed 1 mgm. per kgm.].

Antrycide is usually given subcutaneously, but the intramuscular route is sometimes preferred, especially in pigs ; local reactions are usually slight, but extensive swellings persisting for 15 days have been reported. Dimidium is usually given intramuscularly or intravenously ; necrotic lesions may result from subcutaneous injections.

Immediate poisoning is rare with either drug but delayed toxic effects have been reported, more commonly after dimidium bromide.

Neither drug is as active against *T. vivax* as against *T. congolense*. Antrycide is curative against *T. evansi* in camels and partially effective against *T. simiae* in pigs and against *T. brucei*. Dimidium is not active against these trypanosomes.

Because of the small dose and consequent cheapness, dimidium is likely to remain, in many areas, the drug of choice where large numbers of stock of small value are to be treated. Antrycide may be preferred for more valuable stock.

Prophylaxis.

Repeated dosage of dimidium over a period of some months does not prevent infection with either *T. congolense* or *T. vivax*. A single dose may protect cattle in transit through fly areas for one month.

The form in which antrycide is used prophylactically is known as the "pro salt", which is a mixture of the dimethylsulphate and the dichloride. The East African representative considered that cattle might be protected for 6 months by injecting at intervals of not more than 2 months, but the West African representative thought this would be protective on exposure to riverine tsetse only. It is already known that administration at three-month intervals does not protect in *G. morsitans* areas in West Africa.

The main uses of antrycide as a prophylactic are : (1) in transit through fly belts ; (2) during dry season grazing in fly areas ; (3) in connexion with tsetse clearance schemes, provided that the fly is cleared sufficiently quickly and settlement follows ; and (4) where there is seasonal migration of tsetse flies followed by recession in the dry weather.

In order to limit the danger of the production of antrycide-resistance, which may also involve dimidium-resistance, antrycide should be distributed only under government control ; its prophylactic use should always be directly supervised by persons approved by directors of veterinary services ; the intervals between inoculations should not exceed 2 months and the period of exposure to tsetse flies should not exceed 6 months ; and the greatest care should be exercised in the selection of areas for the temporary introduction of protected cattle. *E. M. Lourie*

NIGERIA. **Sleeping Sickness Service and Medical Field Units Annual Report 1950–51.** [MCLETCHIE, J. L. (S.M.O. i/c.)] 22 mimeographed pp. of text, with tables, 1 diagram & 1 folding map.

This report contains a great deal of impressive detail and cannot be adequately reduced to a short summary. The Sleeping Sickness Service and the recently constituted Medical Field Units are jointly administered, in the charge of Dr. J. L. McLetchie, and the present report consists of an introductory section (2 pages) and statements on the Sleeping Sickness Service (8 pages of text and 4 of tables signed by Dr. A. J. DUGGAN), on Tsetse Control (2 pages) and on the Medical Field Units (10 pages of text and 4 of tables).

At the beginning of the year there were, for both services, 2 medical officers at headquarters and 5 in the field ; later there were only 2 medical officers in the field, one in Sokoto and one in Cameroons, so that the staff for the expanded work of the two services was even less than had been available in 1946 when sleeping sickness activities were less than during the year under review and Field Units had not yet come into being. The considerable activity now reported could therefore have been achieved only by painstaking training of subordinate staff, judicious delegation of responsibilities [and, it may be added, by inspiring leadership].

The original Development Plan envisaged 18 Field Units each of 24 dressers by 1955, but this aim has had to be reduced to 12 Field Units of 20 dressers. Most of the junior staff and dressers for 10 of these Units have been trained but they cannot be fully employed for lack of Senior Officers ; however, prospects of obtaining these senior men seem to be not unfavourable. The Junior Staff receives preliminary training at a school in Makurdi, which has been conducted during the past 4 years by Dr. O'NEIL. Students are housed there in a hostel. About 40 pass through the Makurdi school in the course of a year (receiving instruction in medical, hygiene and laboratory subjects), and the best dozen or so then proceed to a smaller school at Kaduna, established in order to provide advanced instruction and refresher courses. The remainder go direct to the Field Units and dispensaries. In view of the need for attendants with a much increased range of usefulness, now that the Field Units are well established institutions, it is intended to expand the courses of instruction at Makurdi to cover a period of 5 years.

The sleeping sickness position in the old endemic areas of the central provinces of Zaria, Plateau and Benue has remained stable with the exception of 3 foci in which control measures, including tsetse eradication, are being intensified. At the perimeter of the old endemic areas suspicious foci have been detected and are being counteracted ; these are in Niger, Katsina, eastern Kano, Adamawa and Cameroons Provinces. In Adamawa Province the work has been conducted in association with Dr. HUTCHINSON of the West African Institute for Trypanosomiasis Research. Although the subordinate staff is on the whole very reliable, the serious disadvantage of inadequate full-time medical officers is exemplified in, for example, Ogoja Province, where " the type of disease which prevails has become extremely resistant to treatment in recent years, probably as a result of the high rate of abscondment of patients "; one case in 3 is a relapse, and the relapse rate among new cases is of the order of 40 per cent. Statistics are given for each area investigated. In Nigeria as a whole the total number examined was 856,871 and new infections amounted to 3,161 (0·37 per cent.), to which must be added 4,334 new cases diagnosed at dispensaries (not during systematic surveys or resurveys) and at hospitals and missions. This makes a total of 7,495 new cases, which is the lowest since 1931 and about half the total for 1947, in spite of the fact that 100,000 more people were examined than in that year. It seems to the author of the report that the past 4 years have witnessed the decline of an epidemic era of perhaps 20 years. The proportion of relapsed and refractory cases shows a disconcerting tendency to increase, possibly as a consequence of elimination of all but the most resistant strain of trypanosome by years of mass treatment.

In the original Development Plan there was a scheme for large-scale tsetse eradication in Kano, Katsina and Zaria Provinces (including protection of major cattle routes) at an estimated cost of £365,000. This has had to be drastically reduced and a revised plan, for which limited funds have been made available and for which a further £77,000 is likely to be provided by the Production Development Board, will enable eradication to proceed in those provinces by the existing permanent tsetse control staff, which now consists of 2 entomologists and 11 control officers and superintendents. During the year postings have been to Kano, Katsina, Zaria, Plateau and Benue Provinces, and temporarily to the Kontagora Division of Niger Province. Fly has been eradicated from a further 580 miles of stream by partial clearance. Due attention is paid to encouraging proper utilization of reclaimed sites, with provision for nomadic herds, mixed farmers' cattle, sugar cane and market gardening. Labour costs vary, being down to £15 per mile of stream for the Zaria-Katsina area and £70 per mile around Gboko, in the Tiv Division of Benue, where the high cost is justified by the fact that the local strains of human infection are very resistant to treatment and Zebu cattle can now be kept throughout the rains ; the entry of new animals into the 90 square miles now tsetse-free is controlled by the Native Authority in order to prevent overstocking in an area where, previously, cattle could not live. To reduce maintenance in old clearings, some of which require slashing after 13 years, more attention is being paid to very thorough de-barking, piling and burning. More vigorous measures are often necessary, and are mentioned in this report, particularly for dealing with the very troublesome raphia palm (*Raphia sudanica*).

The section on the work of the Medical Field Units describes activities in Benue, Bornu, Sokoto, Plateau, Cameroons and Abeokuta, and contains much interesting and widely-ranging detail which will be invaluable to the student of local conditions, and of which only a very sketchy and selective impression can be given here. In most of the provinces where the units worked there were general medical surveys in unselected sample areas. Almost everywhere the

hyperendemicity of malaria predominates, with parasite rates of 50 per cent. or more. Urinary schistosomiasis appears to be the next most prevalent in many areas, affecting 20 to 47 per cent. in Benue for example ; in one village in the Cameroons it was universal. The incidence of paragonimiasis has probably been overlooked in the past ; it was up to about 4 per cent., at an underestimate, in places in the Cameroons where it was specially sought. Other worm infections such as ascariasis and hookworm infections are, of course, notoriously common.

Epidemic cerebrospinal fever again struck Northern Nigeria in the dry season of 1949–50. In the affected provinces the incidence was 7·2 per 1,000 ; altogether 92,964 cases were reported, with a mortality of 15·4 per cent. In anticipation of another epidemic wave in the 1950–51 dry season all provinces likely to be affected were toured and appropriate preparations were made. However, only 9,000 cases occurred and these were easily dealt with by the Native Authority and Government staffs.

Undernourishment and avitaminosis are extremely widespread, and the incidence of various clinical manifestations of these conditions are given for a number of the areas studied.

Mass vaccination against smallpox is an important part of the activities of the Field Units. The necessity for this work is shown in Abeokuta, for example, where one-tenth of the general population had suffered from smallpox in the past ; in some areas, notably in Bornu, smallpox has been an important cause of eye defects and blindness.

Commendable attention has been paid to collecting vital statistics by the Field Units wherever they have operated. In Sokoto this has provided sinister writing on the wall in the conclusion that, despite a 50 per cent. child mortality rate, the population may double itself in the next 50 years, in the face of undernutrition already seriously present. The overdue introduction of public health measures will inevitably accelerate the increase, and it is little wonder that the reporting medical officer asks, " Where is the food coming from to feed all these people ? " *E. M. Lourie*

Le Gac, P. La trypanosomiase en Oubangui-Chari. Le foyer de Nola, sa chimioprophylaxie par la pentamidine et la lomidine. [**Trypanosomiasis in Oubangui-Chari and its Control by Chemoprophylactic Pentamidine and Lomidine**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 488–94, 3 figs.

The pilot investigations of chemoprophylaxis by pentamidine in the Oubangui-Chari district of French Equatorial Africa were those of Choumara and Souveine starting in 1945 [see Saleun and Chassain, this *Bulletin*, 1948, v. 45, 875]. Until then this district was notoriously heavily contaminated by trypanosomiasis, one of the worst areas being the neighbourhood of Nola, situated on the frontiers of the Cameroons and the Middle-Congo. In spite of repeated treatment campaigns, " Indices of New Cases " of the order of 25 per cent. were observed in the region as a whole, rising to as much as 45 per cent. in the M'Bimou country, which spreads over the frontier into the Cameroons. The M'Bimou country has a population of about 4,000. Mobile treatment teams in these areas reduced the indices of new infection from 12 to 4 per cent. in the Nola district and from 20 to 7 per cent. in the M'Bimou country over the period 1943 to 1946 inclusive. It seemed impossible to bring it any lower because of arseno-resistance. The prophylactic use of pentamidine then enabled considerable further improvement to take place, so that by 1950 the infection was almost eliminated in the treated areas, both in Oubangui-Chari and in the Cameroons. Details are given for various sections of the areas concerned. [For earlier reports on chemoprophylaxis by pentamidine or

lomidine in French Equatorial Africa see KERNEVEZ and CHASSAIN, this *Bulletin*, 1950, v. 47, 825; 1951, v. 48, 959; RAYNAL and LOTTE, *ibid.*, 960.]

E. M. Lourie

LOTTE. Enseignement de quatre années de chimioprophylaxie en A.E.F. [**Lessons of Four Years' Chemoprophylaxis in French Equatorial Africa**] *Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiase No. 146/0.* Léopoldville (Congo Belge). [1951.] 27 mimeographed pp., 23 charts & 1 map.

This important contribution is by Colonel Lotte, now Director of the *Service Général d'Hygiène Mobile et de Prophylaxie* in French Equatorial Africa [corresponding to the S.G.H.M.P. in French West Africa, see this *Bulletin*, 1950, v. 47, 444, and to the Medical Field Units in Nigeria, above]. The contribution merits careful study not merely because it collects into one place the results of 4 years of chemoprophylaxis by pentamidine in all parts of French Equatorial Africa, but because it examines these results, and indeed the whole question of the value of chemoprophylaxis, in highly stimulating and critical fashion [and often in stirring language, *e.g.*, p. 24, "*C'est donc pour nous un devoir impérieux et urgent de rompre à tout prix ce cycle infernal dans une dernière bataille*" !].

So rapidly is chemoprophylaxis being extended to new areas that the results here described go considerably beyond those already reviewed in this *Bulletin*, for references to which see LE GAC, above. Details are given of the work and results (together with relevant historical and topographical data) in each of the following areas :—Districts of Kimongo, Dolisie, Kibangou, Divenie, Sibiti, and Madingou, the Mouyondzi area, the Couloir du Congo, the M'pouya area, the District of Gamboma, Mossaka, Mabirou, Fort-Rousset and D'ewo, the Djambala-Lekana area, the District of Nola, Djomo village on the Bangui-Carnot road, the Districts of Bossangoa, Batangafo, Bouca and Mayoumba (Gabon).

From the epidemiological point of view these areas are grouped into the following 6 categories :—(1) highly endemic zones subject to serious epidemic waves ; (2) zones of constant endemicity, and with a numerous floating population ; (3) zones of residual endemicity ; (4) very limited foci of activity, surrounded by uninfected country ; (5) large foci of very virulent endemo-epidemicity seemingly irreducible by ordinary mass treatment, and (6) zones of feeble endemicity where ordinary mass treatment seems unable to liquidate parasite indices which lie between 0·1 and 1·0 per cent.

It is (as would be expected) in areas of category 4 that chemoprophylaxis achieves radical success quickly, sometimes requiring no more than 1 or 2 prophylactic injections per person. Areas of category 2 require prolonged attention (prophylactic injections repeated at intervals of 6 months for several years) as well as the widest possible coverage of the affected area. Areas of category 5 can also be cleaned up if the effort is persistent enough, while those of category 6 may not need more than a single treatment for the parasite-rate to be brought practically to zero.

Another epidemiological classification which the author has found useful is modified from that of SAUNDERS [this *Bulletin*, 1951, v. 48, 238]. It depends on the topographical distribution of infection and comprises the following types :—(1) "Riverine", which is self-explanatory ; (2) "Linear", ranged along routes of communication ; (3) "Focal", limited and surrounded by uninfected areas ; (4) "Blanket" ("*en nappe*"), implying incidence of no characteristic localization distributed over a geographically homogeneous area ; and (5)

" Rural ", affecting the individual farm or hut in savanna zones. An example of the way in which the author uses this classification to interpret a local situation is provided by the District of Madingou. Here the overall index was 2·7 per cent., but this alone gave no adequate picture of the situation : 27 villages were free of infection ; 15 showed indices below 1 per cent. ; 38 had indices from 1 to 5 per cent., and 30 from 5 to 30 per cent. The distribution of the affected villages did not conform to the riverine, linear or blanket types, and the author takes this to prove that the area is on the verge of an epidemic outburst threatening the whole region, especially in view of the fact that it contains important roads and a railway serving much mining and farming activity.

Emphasis is placed on the importance of a very thorough examination of the entire population before making the prophylactic injections, so that the carriers may receive a full course of curative treatment. It is all too easy to overlook a proportion of such cases. JAMOT, a pioneer of mass treatment, distinguished by his meticulously careful methods, estimated that 6 per cent. of the infected population escaped even his very thorough diagnostic sieve ; and in the course of the present work 10 cases were diagnosed at Djomo among 471 people, but 48 hours later another examination revealed 2 other infections, and again 48 hours later yet 3 more infections—so that 5 patients out of 15 escaped detection at the first mass diagnosis. There is therefore the ever-present danger of giving only a prophylactic dose to a person who is already infected, so that a part of the infective reservoir is by-passed (and a serious disservice is done to the individual).

The author discusses the important question of the extent to which the incidence of infection is reduced among the non-pentamidinized portion of a community to which the prophylactic treatment has not been universally applied, JONCHÈRE [this *Bulletin*, 1951, v. 48, 717] and HARDING and HUTCHINSON [*ibid.*, 1950, v. 47, 824] found the incidence to be reduced by more than half, but the present author's experience did not always accord with this, for on 12 occasions out of 25 the parasite index of the non-pentamidinized not only failed to show any immediate improvement but even increased somewhat. The explanation is that in the work of Jonchère and of Harding and Hutchinson the non-pentamidinized formed a part of the more or less stable community and so benefited by the reduction of the general reservoir, while in the present work the non-pentamidinized were almost exclusively old patients refractory to further treatment, and the floating element, such as labourers, traders and others constantly on the move. A good example is in the Couloir du Congo, a typical area of epidemiological type 2, in the first system of classification above ; in spite of six-month prophylactic injections over a period of 3 years, with regularly diminishing proportion of non-pentamidinized folk, the parasite index among the latter has remained remarkably constant.

A Table shows results of a statistical analysis of the figures obtained, year by year, in all the areas treated, from 1947 to 1951 inclusive. The proportion of non-pentamidinized to pentamidinized fell from 21/15 to 1·2/15 ; the probability of infection among the pentamidinized fell from 1/796 to 1/39,002, while in the non-pentamidinized it remained virtually the same (1/82 to 1/64) ; and the probability that chance might account for the differences between 1/796 and 1/82 on the one hand, and 1/39,002 and 1/64 on the other, were 1/9 and 1/625 respectively.

A strong and reasoned plea is made for close studies of the epidemiology of sleeping sickness, in relation to the prospects of eradication by chemoprophylaxis. The author's objectivity is testified by the fact that he stresses two points that are often slurred over by those who are anxious to claim undue

credit for their efforts in this type of work ; one is that it is all too easy unwittingly to leave a significant part of the population untreated, and the other is that epidemic conditions may recede quite independently of any control measures (as in those areas where the incidence increased when there was a boom in rubber-collecting and porterage and then declined when this industry faded away).

The author concludes that chemoprophylaxis by pentamidine is capable of completely clearing an infected area, but it is no easy short cut and requires the observance of strict rules. Firstly, there is the factor of urgency. " The spectre of chemo-resistance menaces all mass treatment activities " which must therefore be pressed forward with due speed before chemo-resistance gathers momentum. The efficacy of an interval of 6 months between prophylactic pentamidine injections has been established ; no sound case has been made for an interval of 12 months. *Everybody* must be included in the operation in any particular area ; in French territories there is legislative machinery to ensure this. Every means of diagnosis should be used to identify carriers (and then to start them on curative courses of treatment) before giving the prophylactic injections to the remainder of the population. The area to be treated must be judiciously selected in the light of local epidemiological considerations. Deal first with the zones proven by past experience to be refractory to mass treatment by the older methods, in preference to zones where there is good reason to believe the infection is tending spontaneously to diminish ; and be prepared for the possibility that it may be necessary to continue giving the injections systematically every 6 months even for as long as for 4 or 5 years. [This paper has now appeared in *Méd. Trop.* Marseilles, 1951, v. 11, 737.]

E. M. Lourie.

Monnet, A. & Baylet, R. Contribution à l'étude de la toxicité pour la souris du mélaminylphénylarsénone et du mélaminyl-4-phénylarsinodithioglycérine. [**The Toxicity of Melarsen Oxide and of Mel B for Mice**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 510–15.

The first object of this work was to find out whether any increased toxicity results from storage of melarsen oxide or Mel B in the tropics. The subcutaneous LD50 of these compounds for mice was estimated by the method of Kaerber and Behrens. [The numbers of mice used were too small for the LD50 determinations to be accepted as more than very rough approximations ; fiducial limits of error are not given.]

Two batches of melarsen oxide were tested after they had been stored in the tropics, without particular precautions, for about 2 years. The LD50 of each batch was found to be 0·64 mgm. per 20 gm. body weight, which does not differ significantly from the figure of 0·7 mgm. per 20 gm. quoted at a meeting of the American Chemical Society in April, 1944.

A batch of Mel B that had been stored in solution in propylene glycol for a year was compared with a recent batch. The LD50 figures were found to be 0·69 and 0·68 mgm. respectively, per 20 gm. body weight, when tested in male mice (females were more susceptible than males).

There was therefore no evidence of gross enhancement of toxicity in stored batches of either substance.

On the basis that arsenic comprises 22·84 per cent. of melarsen oxide and 18·8 per cent. of Mel B, the LD50 values quoted above may be expressed in terms of arsenic as 0·146 mgm. per 20 gm. for melarsen oxide and 0·129 mgm. per 20 gm. for Mel B. In other words the arsenic is about 10 per cent. more toxic to the mouse when melarsen oxide is given in combination with the detoxicant (BAL) than when it is given alone. This agrees with the findings of

others who have also shown the toxicity of certain arsenicals to be increased when combined with BAL [PETERS and STOCKEN, *Biochem. J.*, 1947, 41, 53 ; WEATHERALL, *J. Pharmacy Pharmacol.*, 1949, 1, 576]. *E. M. Lourie*

ERCOLI, N., GOSFORD, B., CARMINATI, G. M., KLEY, D. & SCHWARTZ, B. S. **Dithiol Antagonism and Potentiation of Chemotherapeutic Agents.** *Proc. Soc. Exper. Biol. & Med.* 1951, Oct., v. 78, No. 1, 253–61, 2 figs. [31 refs.]

Compounds that are effective against trypanosome or spirochaete infections may be divided into two groups, according to whether they are or are not inhibited by BAL. Those that are so inhibited are the metal-containing compounds (As, Au, Sb), penicillin, bacitracin and chloramphenicol. Those that are not inhibited are streptomycin, aureomycin, terramycin, suramin, stilbamidine and acriflavine. Subtilin is usually not inhibited but is sometimes potentiated, not only by the dithiol BAL but even by the monothiol cysteine. The fact that such diverse substances as the metallic compounds, penicillin, bacitracin and chloramphenicol are all antagonized by an identical inhibitor (BAL) suggests that their chemotherapeutic action depends on a mechanism or on a receptor system that is common to them all. The inhibiting effect of BAL is specific in the sense that the monothiols, cysteine and glutathione, do not share its inhibitory property (suggesting that a " dithiol enzyme " may be involved in the mode of chemotherapeutic action of the BAL-reversible compounds). The inhibitory effect of BAL is also specific in the sense that while it is exercised in respect of the anti-spirochaete action of certain drugs, it is not exercised in respect of their antibacterial action ; this shows that the inhibition cannot be attributed to a chemical inactivation, *i.e.*, to mere combination of the drug with the BAL. The only drug which BAL was found to inhibit in both spirochaetal and streptococcal infections was myocrysin, which may accordingly be presumed to act against the two infections by a common mechanism.

Probably because of competitive renal elimination, BAL increases the blood levels of penicillin when the latter is given in high dosage, with effect that the impression may be created of a potentiation of penicillin action against *Bact. coli* infection while an inhibitory process is actually in operation.

There is good reason to believe that BAL-inhibition of toxicity towards the parasite does not necessarily depend on the same mechanism as BAL-inhibition of toxicity towards the host ; and a drug may be inhibited in regard to its action on the parasite while being immune from inhibition in regard to its action on the host. Indeed, in the case of stibophen, BAL has the effect even of increasing the drug's toxicity to the host while at the same time inhibiting its action against the invading trypanosome. Selective inhibition of trypanocidal action and not of toxicity to the host has also been described recently in respect of the influence of methyl-*p*-hydroxybenzoate on acriflavine and arsenicals [SCHLEYER and SCHNITZER, this *Bulletin*, 1949, v. 46, 915]. *E. M. Lourie*

NANI, S. Ricerche sulla resistenza a temperatura ambiente ed in ghiacciaia del *Trypanosoma evansi*. [**Resistance of *Trypanosoma evansi* at Room Temperature and in the Refrigerator**] *Riv. di Parassit.* Rome. 1951, Oct., v. 12, No. 4, 227–32.

The English summary appended to the paper is as follows :—

" The author has performed some researches on the resistance of the *Trypanosoma evansi* at about +18°C. and at about 0°C. From the results acquired, it appears that the parasite infecting power for the white mouse, lasts 72 hours at 18°C. and 58 hours at 0°C. In the first case, the infecting power can still be shown when the parasite undergoes evident autolytic phenomena of the cytoplasm of the undulating membrane and flagellum ; in the

second case the infecting power ends when the trypanosoma shows still its normal morphology and mobility."

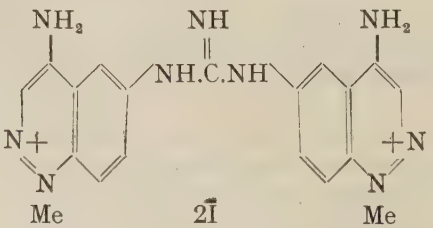
CEBE, J. Chimiothérapie des trypanosomoses animales. Etat actuel de la question. [**Present Position of the Chemotherapy of Animal Trypanosomiasis**] *Bull. Serv. Élevage Afrique Occid. Franç.* 1951, Jan.–Mar., v. 4, No. 1, 69–104. [137 refs.]

LOURIE, E. M. & WALKER, J. M. **Dependence of the Toxicity of Antrycide Methylsulphate in Mice on the Volume of a Dose injected Subcutaneously.** *Brit. J. Pharmacol. & Chemotherapy.* 1951, Dec., v. 6, No. 4, 630–33, 1 fig.

It has been noted [this *Bulletin*, 1950, v. 47, 827] that the methylsulphate of antrycide was rapidly absorbed when administered subcutaneously to mice, in comparison with the insoluble chloride, and also proved more toxic. The present authors have investigated how toxicity is affected by the volume of fluid in which this drug is administered by the route mentioned. When a dose of 0·75 mgm. per 20 gm. was given in a volume of 0·1, 0·2, 0·4, and 0·8 ml. under similar conditions it was found that the mortality rates varied considerably, being greatest with the smallest dose. The volume of fluid introduced in absence of drug was ruled out as a contributory cause of death, which was believed to be largely due to the difference in the rate of absorption of drug. In stating the LD50 it would therefore be of advantage to indicate the exact volume of drug solution administered and in the field solutions as dilute as practicable should be used in treatment of cattle with antrycide, since SPINKS [this *Bulletin*, 1951, v. 48, 345] has shown that a sharp peak occurs in blood level about one hour after dosage. *J. D. Fulton*

LOURIE, E. M., MORLEY, J. S., SIMPSON, J. C. E. & WALKER, J. M. **A Cinnoline Compound ("528") for the Treatment of** *Trypanosoma congolense* **Infections.** *Brit. J. Pharmacol. & Chemotherapy.* 1951, Dec., v. 6, No. 4, 643–50. [16 refs.]

The most active substances used in the treatment of *T. congolense* infections of cattle are quaternary ammonium salts such as those of phenanthridine introduced by BROWNING *et al.* [this *Bulletin*, 1938, v. 35, 344] and of antrycide discovered by CURD & DAVEY [*ibid.*, 1949, v. 46, 338]. Guided by the experience of earlier workers the present authors have prepared quaternary salts of quinoline, cinnoline and quinazoline in which there is considerable scope for the introduction of substituent basic groups. An outline of the steps leading to the preparation of the substance "528" of the title, have previously been given by KENEFORD *et al.* [this *Bulletin*, 1948, v. 45, 690]. It has the following constitutional formula.



N^1 : N^3-bis(4′-amino-cinnolyl-6′)-guanidine methiodide.

Its toxicity and activity resembled that of antrycide and was considered worthy of a clinical trial. *J. D. Fulton*

Brasil, A. Estudo do sistema nervoso autônomo do coração na cardiopatia chagásica crônica. [**Study of the Cardiac Autonomic Nervous System in Chronic Chagas's Disease**] *Rev. Assoc. Méd. Minas Gerais.* 1951, May, v. 2, No. 1, 67–77, 7 figs.

The English summary appended to the paper is as follows :—

"Several patients were submitted to atropine (4 times 1 /2 mg by endovenous injections) and adrenalin tests (Park Davis, from half to one cc. by subcutaneous injections) and change of body posture, each test taking about 30 minutes. Ecg was performed before, during and after every test. The conclusion was that the bradycardia of many chronic cases of Chagas' heart disease entails the SA nodal depression. This explains various phenomena searched for at this phase of the disease : the bradycardia ; the great resistance of the heart to insufficiency ; sudden death ; the absence of subjective symptoms in many cases ; probably the curious electrocardiographic mutability of the disease ; and, perhaps, many heart blocks.

"The author suggests that the SA depression be a datum of the physiological diagnosis of such cases, and reminds that the SA depression is not dealt with in 'Nomenclature and Criteria for Diagnosis of Diseases of the Heart', nor is Chagas' heart disease. The author thinks that Chagas' disease can be essentially caused by lesion of the intrinsic system of the heart or its neuro-muscular system. He asserts that the clinical diagnosis of a case suspected of chronic Chagas' heart disease is possible because the relative or absolute bradycardic rhythm in which the ACV or AC jugular waves are not rendered clearly more frequent after the endovenous injections of atropine sulfate in doses of half a mg three times in 30 minutes points to the SA depression which he considers proper to Chagas' heart disease."

LEISHMANIASIS

Fulton, J. D. & Niven, Janet S. F. **Studies on Protozoa—Part III.—Visceral Leishmaniasis in the Cotton Rat** (*Sigmodon hispidus*). *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, June, v. 44, No. 6, 717–28, 3 graphs & 4 figs. on pl. [13 refs.]

An account is given of the course of infection and pathological changes in the cotton rat (*Sigmodon hispidus*) experimentally infected with *Leishmania donovani*, and a comparison is made with experimental leishmaniasis in the golden hamster. For this investigation 148 cotton rats and 51 hamsters were inoculated intraperitoneally with 0·5 ml. of spleen emulsion (containing about 14 million parasites) from an infected cotton rat. The course of infection was followed by killing the animals at intervals and counting the number of leishmanias in smears of liver, spleen and bone-marrow, while cultures were used in the early stages of the infection, when parasites were scanty. For histological examination, the tissues were fixed and sectioned. After the 6th month of infection, some cotton rats were treated by 10 intraperitoneal injections of pentostam given on alternate days at a dosage of 200 mgm. Sb per kgm. of body weight, and the results were assessed by examination of stained sections of the spleen and liver.

These observations showed that in the cotton rat *L. donovani* produces a relatively benign disease, which runs a progressive course without any tendency to spontaneous recovery. The spleen is heavily infected and undergoes pathological changes which can be removed by drug treatment. The invaded liver

manifests no changes, and the bone marrow functions normally, since no changes are produced in the blood picture. The course of infection in the cotton rat is similar to that in the Chinese hamster but differs considerably from the infection in the golden hamster, in which the pathological changes are more marked. *C. A. Hoare*

FENG, L. C. **The Rôle of the Peritrophic Membrane in Leishmania and Trypanosome Infections of Sandflies.** *Peking Nat. Hist. Bull.* 1950–51, Dec.–Mar., v. 19, Pts. 2/3, 327–34, 9 figs. on pl.

In China development of *Leishmania donovani* has been observed only in *Phlebotomus chinensis* and *P. mongolensis*. In *P. chinensis* the infection persists in the forward parts of the gut after the last of the blood meal has been excreted, but in *P. mongolensis* the infection in the fly ceases with the discharge of the residue of the blood meal from the anus. In both species a peritrophic membrane is laid down in the stomach round the ingested blood. In *P. mongolensis* the blood is completely enclosed by the peritrophic membrane and, although flagellate forms of *L. donovani* develop, they are confined within this envelope and do not escape to infest the forward or the hind parts of the gut. All the flagellates are excreted with the digested blood-meal within the enveloping membrane. In *P. chinensis* the peritrophic membrane forms a complete envelope for 48 hours after feeding, but later it breaks down. Flagellates of *L. donovani*, which multiply rapidly in this species of sandfly, then migrate forward to the proventriculus where they are attached and well established by the 6th day. At a corresponding interval there would be neither blood nor *L. donovani* parasites in *P. mongolensis*. After the digested blood meal is excreted by *P. chinensis*, flagellates may still be found in the stomach and are particularly numerous in the proventriculus, from which they invade the pharynx, buccal cavity, and mouth parts.

P. squamirostris feeds on toads, lizards and snakes. It acts as a vector of *Trypanosoma bocagei* of toads (*Bufo gargarizans*). A peritrophic membrane is laid down round the blood meal, but the crithidial stages of the trypanosome, escaping through the incomplete closure of the membrane at the hind end of the stomach, reach the hind gut where they become attached to the gut epithelium and develop to the infective stage.

The peritrophic membrane in *Phlebotomus* is identified as chitinous since it resists solution in potassium hydroxide. It is thought to arise from proventricular cells. *D. S. Bertram*

HENRY, A. F. X. Kala-Azar et Paludofloculation. [**Kala Azar and Melano-Flocculation**] *Riv. di Malariologia.* 1951, Aug., v. 30, No. 4, 195–8.

The English summary appended to the paper is as follows :—

" Melanoflocculation, accurately used, is not common to kala-azar and malaria. A positive melano-flocculation reaction in a kala-azar patient is due to concomitant malaria. The test should be repeated after antimalarial treatment or patients should be kept under observation after recovering from kala-azar.

" Hydro-serum-flocculation, even with an index over 100, can not replace other serological, cytological or parasitological tests. The often used formol-leuco-gel test is useful in little laboratories and other known tests are also of value.

" Hydro-serum-flocculation is no substitute for melano-flocculation : the reaction might be absent or retarded in robust subjects, with only recently contracted malaria, and fail to reveal clinical specificity in subjects with instable serum."

CHAUDHURI, R. N. & DUTTA, B. N. **A Study of Cadmium Test in Tropical Diseases.** *Indian Med. Gaz.* 1951, June, v. 86, No. 6, 240–41.

The cadmium test was first described by WUNDERLY & WUHRMAN (*Schweiz. Med. Woch.*, 1945, v. 75, 1128) and the present authors have applied it in the study of liver function in tropical diseases. For the test, 0·2 ml. of 0·4 per cent. cadmium sulphate solution is added drop by drop to 0·4 ml. of freshly centrifuged serum in a small tube and mixed by gentle shaking. The tube is examined after 1 and 5 minutes and the turbidity measured by examining the tube against light with the crossbar of a window as a background. In negative reactions, no change occurs in 5 minutes ; in doubtful reactions, turbidity is slight but perceptible in that time ; in + to + + reactions, the turbidity is sufficient to obscure the crossbar in 5 minutes ; and in + + + reactions, white turbidity appears at once, within 1 minute or on addition of 0·1 ml. only of reagent.

The test was carried out with the sera of 202 patients ; 126 were cases of kala azar, 32 were acute malaria, " splenomegaly ", anaemia, jaundice and cirrhosis accounted for 8, 5, 4 and 2 cases and the remaining 25 were classified as " other cases ".

The results are shown in a table. In the kala azar cases, 68·2 per cent. were + + +, 25·4 per cent. + + and 6·3 per cent. + : there were no negative results.

None of the other conditions listed gave + + + results and only one case of jaundice gave a + +. A + result was given by 4 of the 32 cases of malaria, 3 of 8 " splenomegaly ", and 1 each of the other three specified conditions. All the 25 " other cases " were negative.

The authors discuss briefly the mechanism of the test and suggest that the positive result in kala azar may be explained by the hyperglobulinaemia and hypoalbuminaemia which occur in that disease. *H. J. O'D. Burke-Gaffney*

DURAND, P., BENMUSSA & CARUANA. A propos du traitement du kala-azar par le glucantime. [**On the Treatment of Kala Azar by Glucantime**] *Congrès Internat. Hyg. et Méd. Méditerranéennes Alger, 3, 4, 5 Avril 1950.* 131–4.

The 6 patients previously treated by the authors [this *Bulletin*, 1947, v. 44, 56] are still living and well. Three of them had had previous treatment by other antimonials or the diamidines without being cured. Five were cured with two courses of glucantime and one with a single course.

As there had been no previous experience with this drug the authors adopted a cautious dosage and gave injections on alternate days, but in the following series of cases, in order to maintain a high concentration of the drug in the blood, daily injections were given.

In all the cases the diagnosis was confirmed by the finding of leishmaniae, usually by sternal puncture.

The first case was a boy of 4 years who received a total dose of 1·50 gm. /kgm. body weight or 45 gm. of glucantime and was cured ; he was well 4 years later.

The second was a girl of 8 years ; she was given 18 daily injections amounting to 27 gm. and was cured ; she was seen 3 years later and was still well.

The third case was an infant of 3 months who received 10 gm. in 19 injections and remained well up to 2 years later.

The fourth case was a child of 2 years of age ; he was given a total of 15 gm. in 2 series, and was still well 2 years later.

The fifth was a child of 6½ months. She was given 0·1 gm. /kgm. per day ; after the 10th injection she developed jaundice and treatment was interrupted. She died 6 months later. The liver showed fatty degeneration : no leishmaniae were found in the spleen or bone marrow.

The sixth case was a child of 6 years. There was little response to 2 courses of injections of 24 and 19 gm., respectively, and even after 4 courses leishmaniae persisted. Other drugs including streptomycin and penicillin and finally " lomidine " were given ; although the spleen still remained large, leishmaniae were now absent and treatment with the last named drug was being repeated.

The seventh case was a child of 14 years. A course of 42 gm. failed to effect a cure : tuberculosis was suspected as a complication and a course of diamidine was commenced.

There were thus, in addition to the previous 6 successful treatments reported, a total of 4 successes and 3 failures with this drug. *L. E. Napier*

Trejos, A. & Echandi, C. A. Comprobación del poder patógeno para hombre de cultivos de *Leishmania brasiliensis* Vianna, 1911. (Nota previa.) [**Pathogenicity for Man of Cultures of** *Leishmania brasiliensis*] Reprinted from *Rev. Méd. Costa Rica.* 1951, v. 18, No. 204, 91–2.

The English summary appended to the paper is as follows :—

" The authors show that a culture of newly isolated *Leishmania brasiliensis*, when inoculated intradermally, can be pathogenic to human subjects, with the production of typical cutaneous lesions.

" In two cases in which the inoculation was carried out, the authors were able to demonstrate the presence of *L. brasiliensis* by direct examination and by culture of the lesions."

FEVERS OF THE TYPHUS GROUP

Giroud, P. & Grjebine, A. Fièvres exanthématiques au Moyen Congo et toxoplasmoses. [**Exanthematic Fevers in the Middle Congo, and Toxoplasmosis**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 1 /2, 54–7, 2 figs. on pls.

The clinical picture of typhus in Europeans in the Middle Congo is nearly always the same, and an ulcer, or *tache noire*, is rarely absent.

As early as 1937, the murine strain of rickettsia was shown to occur at Brazzaville and in the Belgian Congo, and in the latter the epidemic strain has also been isolated in high localities where lice are found. More recently a strain which was identified as of the boutonneuse type has been isolated.

Ten cases were studied clinically and serologically ; of sera taken from the 10th to the 22nd days of illness, 4 agglutinated a strain of *R. conori*, 2 at 1 in 160, and 2 at 1 in 640, 5 agglutinated the epidemic strain, *R. prowazeki*, and one agglutinated also a murine strain.

Proteus OX19 was agglutinated 4 times, *OXK* or *OXL* 5 times, and *OX2* not at all.

It is, however, considered that there are only two forms of typhus in the Middle Congo, namely the murine and the boutonneuse.

In the course of their experiments with animals inoculated with the blood of patients and with ticks, *Toxoplasma* was encountered. The blood of a European who presented a clinical picture of exanthematic fever with an eschar was inoculated into the peritoneum of a guineapig and produced in that animal, and subsequently on passage in other guineapigs, pyrexia, enlargement of the spleen and the presence of *Toxoplasma* in large numbers in the peritoneal fluid and vaginal exudate. Inoculation of the latter into the skin of a rabbit produced a classical reaction which it was possible to neutralize by the serum of the patient.

A similar infection was produced in a guineapig by the inoculation of a "pool" of *Rhipicephalus sanguineus*.

This benign form of toxoplasmosis represents a transition between the grave form of the disease, and inapparent congenital infections.

[Two photomicrographs of *Toxoplasma*, in the peritoneal and in the vaginal exudates of guineapigs, leave no doubt about the identity of these parasites. For later work, see this *Bulletin*, 1952, v. 49, 32.] *L. E. Napier*

Cox, H. R. **Some Recent Advances and Current Problems in the Field of Rickettsial Diseases.** *Arch. f. d. Gesamte Virusforschung.* 1951, Oct. 19, v. 4, No. 4, 518–33. [92 refs.]

Weyer, F. Über die in-vitro-Wirkung von Aureomycin, Chloromycetin und Terramycin auf Rickettsien nach Versuchen in der Kleiderlaus. [**Tests on Body Lice of the Action *in vitro* of Aureomycin, Chloramphenicol and Terramycin on Rickettsiae**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, Oct., v. 3, No. 2, 215–30. [18 refs.]

The author describes interesting experiments in which laboratory-bred lice were inoculated intrarectally with living rickettsial suspensions which had been previously treated with varying amounts of solutions of aureomycin, chloromycetin [chloramphenicol] and terramycin ; lice inoculated with similar doses of untreated suspensions served as controls. The effect of the drugs was estimated by examining smears of the guts of the lice 3 or more days after inoculation ; in some cases suspensions of the lice were inoculated intraperitoneally into white mice to check the viability of the rickettsiae. Strains of *Rickettsia prowazeki*, *R. quintana*, *R. mooseri* and *R. rickettsi* were employed. *R. burneti* was tested by intranasal and intraperitoneal inoculation of the treated suspensions into white mice, but none of the drugs had any inhibiting effect.

The chief findings were that aureomycin was rickettsiocidal when allowed to act for 3 hours in concentrations of 1–300 and 1–3,000 ; terramycin appeared to be equally effective, but chloromycetin, even in the higher concentration, had only a rickettsiostatic effect on *R. prowazeki* and *R. quintana* and had no inhibiting effect on *R. rickettsi*.

[The action of the drugs can hardly be regarded as purely *in vitro* ; the suspended rickettsiae were not washed before inoculation.]

John W. D. Megaw

Blanton, F. S. & Tani, T. G. **Typhus Control at Ports in Japan and Korea after World War II.** *J. Econom. Entom.* 1951, Oct., v. 44, No. 5, 812–13.

The author describes a great organized effort for the control of louse-borne typhus in Japan in 1946. About two million repatriates were dusted with DDT at 11 Japanese ports, and in the epidemic at Osaka more than three million persons were dusted within a period of 17 days. In the epidemics in Japan about 30,000 cases occurred in 1946 ; the fatality rate was 7–10 per cent. *John W. D. Megaw*

Heim de Balsac, H., Le Gac, P. & Giroud, P. Étude des rongeurs de l'Oubangui-Chari (A.E.F.). Détermination de certaines espèces susceptibles de représenter des réservoirs de virus. (Première note.) [**A Study of the Rodents of Oubangui-Chari**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 9/10, 695–700.

This is a preliminary note on a survey of the mammals of Oubangui-Chari, in French Equatorial Africa, with special reference to those of potential importance as reservoirs of infection.

Ten species of rodents are described in the present communication.

John W. D. Megaw

WERTMAN, K. & SARANDRIA, J. L. **Complement-Fixing Murine Typhus Antibodies in Vitamin Deficiency States. II. Pyridoxine, and Nicotinic Acid Deficiencies.** *Proc. Soc. Exper. Biol. & Med.* 1951, Oct., v. 78, No. 1, 332–5.

Weanling rats were kept for 6 weeks on diets deficient only in respect of nicotinic acid or pyridoxine, and then were inoculated intraperitoneally with formalinized suspensions of *Rickettsia typhi* [*mooseri*]. The inoculations were repeated weekly on two further occasions and the complement-fixation titres were tested a week after each inoculation.

Nicotinic acid deficiency made no difference in the titres as compared with control rats but the pyridoxine-deficient rats failed to produce appreciable amounts of antibodies after the first small dose of suspension which caused antibody production in all the control rats. After three inoculations the antibody production of the pyridoxine-deficient rats was "influenced unfavourably". [The figures shown in the Table do not bear out this statement; the average titre after three inoculations was higher among the test rats than among the controls.] *John W. D. Megaw*

GAINES, T. B. **The Failure of the Rodenticide Warfarin to injure Oriental Rat Fleas when the Poison is fed to the Host Rat.** *J. Parasitology.* 1951, Oct., v. 37, No. 5, Sect. 1, 489–90.

GIROUD, P., LE GAC, P., ROUBY, M., LAGARDE, J. & GAILLARD, J. A. Contribution a l'étude des rickettsioses en Oubangui-Chari consécutives au feu de brousse; quatre nouveaux cas à Bangui. Cas cliniques, comportement sérologique, isolement des souches. Résultats spectaculaires des antibiotiques. [**A Study of the Rickettsioses of Oubangui-Chari which followed Bush Fires**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 9/10, 571–9, 4 charts & 2 figs. on 2 pls.

Four cases of murine typhus are described in which infection appears to have been communicated from rats driven into the dwellings by bush fires. The diagnosis was made by rickettsia-agglutination tests. In two cases the Weil-Felix tests were negative. *Rickettsia burneti* was agglutinated in three cases at titres of 1–20 to 1–80, and *R. akari* in one case at 1–20. The last reaction is regarded as confirming the occurrence of "vesicular rickettsiosis" [rickettsialpox] in the area, where the authors have recently seen two cases [see this *Bulletin*, 1952, v. 49, 35]. *John W. D. Megaw*

MUNRO-FAURE, A. D., ANDREW, R., MISSEN, G. A. K. & MACKAY-DICK, J. **Scrub Typhus in Korea.** *J. Roy. Army Med. Corps.* 1951, Oct., v. 97, No. 4, 227–9.

Two young British soldiers belonging to the same regiment were attacked by scrub typhus in Korea in June, 1951. In each case there was an eschar with local lymphadenitis. The Weil-Felix reaction (*OXK*) was positive in one patient at a titre rising to at least 1–10,240 on the 28th day, and in the other at 1–2,560 on the 18th and again on the 30th day.

Both patients had temporary deafness; one had a rash of "rose spots"; the other had no rash. There was a good response to treatment with chloromycetin [chloramphenicol] and aureomycin.

These are believed to be the first cases in which scrub typhus has been diagnosed in Korea. *John W. D. Megaw*

KITAOKA, M., SHISHIDO, A., KATO, G., YOSHIDA, S. & GOTO, G. **The Control of Scrub Typhus in Niigata Prefecture 1949. I. Protective Measure by the Use of Repellents (Dimethyl Phthalate and Benzyl Benzoate).** *Japanese Med. J.* 1950, Dec., v. 3, No. 6, 381–8, 1 fig. [19 refs.]

The authors describe the successful control of scrub typhus in the notorious riverine area of the Niigata Prefecture of Japan where, from 1917 to 1947, the average yearly incidence of the disease was 60 cases and the average case fatality rate was 35 per cent. The attack rate among the cultivators who entered the area each year was about 1·5 per cent.

In 1948, 2,272 acres, out of a total cultivable area in the infected zone of 4,852 acres, was under crops.

A previous effort had been made to control the disease by vaccination with a living Pescadores strain of rickettsia but this caused severe reactions and a few deaths. Killed vaccines prepared in Washington were found ineffective.

The method adopted on a small scale in 1948 and on a large scale in 1949 was treatment of the clothing with a 6 per cent. emulsion of benzyl benzoate on 3 occasions during the season, which was June to September. Each worker was also given about 4 oz. of dimethyl phthalate for application to the unprotected skin during the season.

Among 3,031 persons protected there were 9 attacks but in every case the clothing had become torn or had not been worn at the time of attack by the infecting mite. Some irritation of the skin of the neck and groin was caused by the benzyl benzoate but the morale of the workers was so greatly improved that it has been found possible to bring the whole of the area under cultivation.

John W. D. Megaw

KITAOKA, M., SHISHIDO, A., KATO, G., KATSURA, S., ITO, T., TATAMI, S., MATSUZAWA, K. & MACHIDA, I. **The Control of Scrub Typhus in Niigata Prefecture 1949. II. Treatment of Scrub Typhus in Niigata with Paba and Chloromycetin.** *Japanese Med. J.* 1950, Dec., v. 3, No. 6, 389–413, 6 figs. [15 refs.]

The good results following treatment of Japanese scrub typhus with para-aminobenzoic acid and the still better results obtained with chloramphenicol are described.

The clinical features of the disease were of the usual type. Among 17 cases the leucocyte count in 11 was less than 5,000 per cmm. and in the other 6 it was "almost" 6,000. An eschar with pronounced regional lymphadenitis occurred in all the cases.

John W. D. Megaw

PIZA, J. de T., DE MACEDO, J. J., MONTEIRO, E. L., BRANDÃO, C. H. & NETO, L. P. B. Associação da aureomicina utilizada por via muscular e da cloromicetina por via oral, no tratamento da febre maculosa. [**Association of Aureomycin used by Intramuscular Route and of Chloromycetin by Oral Administration in the Treatment of Rocky Mountain Spotted Fever**] *Rev. Inst. Adolfo Lutz.* São Paulo. 1950, v. 10, No. 1, 35–48, 3 graphs & 6 coloured figs. [17 refs.] English summary.

A single uncontrolled case, which is compared with two others, to whom aureomycin was given orally.

BLEWITT, B. **"Q" Fever : a New Disease in Armies.** *J. Roy. Army Med. Corps.* 1951, Nov., v. 97, No. 5, 377–88. [70 refs.]

Fonseca, F. & Pinto, M. R. Valor das epizootias nas epidemias das rickettsioses. [**The Significance of Epizootics in Connexion with Epidemics of Rickettsial Diseases**] *Gaz. Méd. Portuguesa.* 1951, v. 4, No. 3, 536–42, 2 maps. English summary.

A study of the rickettsial fevers in Portugal has led the authors to the not surprising conclusion that the prevalence in man of Q fever, murine typhus and boutonneuse fever depends entirely on the occurrence of these diseases among lower animals, and that human infection is purely a secondary occurrence, playing little or no part in the maintenance of infection.

Q fever is stated to be widely disseminated among cattle, goats and sheep in Portugal ; after a peak period of incidence in 1948–49 the disease in man has been declining so that only 3 cases have been reported in 1951. The decline is attributed to immunity acquired by the offspring of infected animals, either *in utero* or by drinking the mothers' milk. Experiments in guineapigs, now described, show that such immunity is actually produced. *John W. D. Megaw*

di Marco, I. & d'Agata, A. Ulteriore contributo alla epidemiologia della febbre Q in Catania. [**Further Observations on Q Fever in Catania**] *Acta Med. Italica.* 1951, Sept., v. 6, No. 9, 235–7, 3 figs.

The English summary appended to the paper is as follows :—

" The authors describe two cases of Q fever, serologically positive (complement deviation at high titre with Rickettsia burneti), observed last year in Catania.

" Both cases showed clearly atypical clinical course and laboratory tests."

Clark, W. H., Lennette, E. H. & Romer, Mary S. **Q Fever in California. XI. An Epidemiologic Summary of 350 Cases occurring in Northern California during 1948–1949.** *Amer. J. Hyg.* 1951, Nov., v. 54, No. 3, 319–30, 2 figs. [31 refs.]

The epidemiological features of Q fever in North California are discussed in the light of a careful study of 350 cases observed in 1948 and 1949.

Most of the attacks occurred in the part of the central valley in which intensive agricultural, dairying and stock-breeding activities are prevalent. Cases have been reported from 27 of the 48 counties of the area. Nearly 70 per cent. of the attacks occurred during the months of March, April and May and there seems to be an association with such seasonal operations as lambing, castration and docking of the sheep which were the chief reservoirs of infection. In South California, where contact with cattle was the chief source of infection, no such seasonal prevalence was observed.

There were more than 10 times as many cases among males as among females, and 83 per cent. of the patients were aged 20 to 59 ; the youngest patient was 9 years old. Only 93 of the 350 patients had no direct contact with live-stock. There was only one case in which infection was probably acquired through contact with a patient. There was little evidence of outbreaks having occurred through the common use of infected milk or food. Ticks or other arthropods could not be incriminated.

Inhalation of infected dust or droplets was suspected of having played an important part in transmission.

Surveys of the general population by complement-fixation testing indicated that inapparent attacks must have occurred in the affected areas in numbers proportional to those of the obvious cases. *John W. D. Megaw*

Smith, J. D. & Stoker, M. G. P. **The Nucleic Acids of *Rickettsia burneti*.** *Brit. J. Exper. Path.* 1951, Oct., v. 32, No. 5, 433–41, 1 fig. [25 refs.]

"Suspensions of *R. burneti* have been prepared which are believed to contain little, if any, material derived from the host cell. The compositions of the nucleic acids present in the rickettsiae in these preparations have been examined quantitatively, using paper chromatography and spectrophotometric methods.

"*R. burneti* contains 9·7 per cent (dry weight) deoxypentose nucleic acid and about 4·3 per cent ribonucleic acid. Different preparations have the same content of DNA but the amounts of RNA differ. The nucleic acids do not account for all the phosphorus in the organisms.

"The purine and pyrimidine composition of the rickettsial DNA has been determined. No 5-methyl cytosine could be detected in this nucleic acid.

"Deoxypentose nucleic acid has been isolated from normal chick embryos and its purine and pyrimidine composition determined. The proportions of adenine, guanine, cytosine and thymine in this nucleic acid do not differ appreciably from that of the rickettsial DNA. The embryo nucleic acid, however, contains 5-methyl cytosine amounting to 4·3 per cent. of the cytosine content.

"The amino-acids present in the rickettsiae have been identified by paper chromatography."

Blanc, G., Joyeux, C. & Bruneau, J. Observations sur les larves de *Trombicula autumnalis* (Shaw) dans le centre de la France. Recherches sur leur rôle possible dans la transmission de la maladie de Derrick-Burnet (Q. Fever). [**A Study of the Larvae of *Trombicula autumnalis* (Shaw) in Central France. An Enquiry into their Possible Rôle in the Transmission of Q Fever**] *Arch. Inst. Pasteur du Maroc.* 1951, v. 4, No. 4, 314–25, 5 charts.

The authors have studied the habits of the larvae of *Trombicula autumnalis* in central France. The larvae could change their host, but only if they had not already fed or had only just commenced to feed.

Larvae were allowed to feed on guineapigs infected with Q fever and 24–54 hours after becoming detached were found infective to guineapigs by intraperitoneal inoculation, but it was impossible to determine whether the rickettsiae had multiplied in the mites or had merely survived in them.

John W. D. Megaw

Ormsbee, R. A., Lackman, D. B. & Pickens, E. G. **Relationships among Complement-Fixing Values, Infectious Endpoints, and Death Curves in Experimental *Coxiella burnetii* Infection.** *J. Immunology.* 1951, Oct., v. 67, No. 4, 257–64, 4 figs.

In the experiments described in this paper a remarkably close correlation was found to exist between (*a*) the complement-fixation titre of suspensions of different strains of living *Coxiella* [*Rickettsia*] *burneti*, (*b*) the time at which death occurred in 50 per cent. of embryo chicks inoculated with the same dose of each suspension, and (*c*) the "infectious end point", determined by finding the smallest dose of each suspension that caused infection in yolk sacs and guineapigs.

The findings suggest that the fixation test can be used to measure the relative infectiousness of rickettsial suspensions, and presumably also their potency as vaccines.

Ten per cent. yolk-sac suspensions were employed in the tests; their complement-fixing values were, 8; 25; 50; and 180 respectively.

Full details of the experiments are given. *John W. D. Megaw*

Babudieri, B. & Ravaioli, Leonida. L'intradermoreazione nella diagnosi della febbre Q, nella cavia. [**The Intradermal Reaction in the Diagnosis of Q Fever in Guineapigs**] *Rendiconti Istituto Superiore di Sanità.* Rome. 1951, v. 14, Pt. 7, 532–9. English summary.

The authors compared the results obtained with the Giroud intradermal test with those of the complement-fixation test in the diagnosis of experimental Q fever in guineapigs. The skin test did not become positive till the 16th day after inoculation, whereas the fixation test was usually positive by the 7th day. In some cases the skin test remained persistently negative.

John W. D. Megaw

YELLOW FEVER

Gillett, J. D. **The Habits of the Mosquito** *Aëdes* (*Stegomyia*) *simpsoni* **Theobald in relation to the Epidemiology of Yellow Fever in Uganda.** *Ann. Trop. Med. & Parasit.* 1951, Sept., v. 45, No. 2, 110–21. [21 refs.]

Field surveys have shown that in several areas of Uganda the greater part of the African population has not acquired immunity to yellow fever, although conditions are similar to those studied intensively in Bwamba county, where immunity in the African is established to a high degree. In Bwamba, the African acquires immunity after exposure to infection from infected *Aëdes simpsoni*, the semi-domestic mosquito of the plantations, which takes up virus from infected forest monkeys during their periodic raids into the crops. Studies of the mosquitoes breeding in non-immune areas near Entebbe and elsewhere showed that, although substantial breeding of *Aëdes simpsoni* occurred, the adults were not feeding on man. Thus, none of this species was taken in collections of 5,291 mosquitoes whereas, at Bwamba, 30 of 94 mosquitoes biting man were *Aëdes simpsoni*. It is concluded that *Aëdes simpsoni* is a man-biter in some but not in all the areas where it occurs.

It is thought that density of the population of *Aëdes simpsoni* in an area cannot be the sole explanation of this host difference between different areas. Selection of man is characteristic at altitudes below 3,800 feet and indifference to man at higher altitudes. It is postulated that temperature effects may be associated with altitude but how these would influence the mosquito is not certain. No morphological differences related to biting habits are known.

There is evidence to support the suggestion that the few immune persons in generally non-immune areas may be infected by *Aëdes africanus* on its occasional visitations from forest to plantations.

In a discussion of the domestication of *Aëdes simpsoni*, it is noted that it has been found only in tree-holes in West Nile Province and is known as a tree-hole breeder in West Africa. It may perhaps become semi-domestic first by making use of the numerous suitable breeding places provided in plantations of colocasia, etc., later acquiring the habit of feeding on the human population.

D. S. Bertram

Haddow, A. J., Dick, G. W. A., Lumsden, W. H. R. & Smithburn, K. C. **Monkeys in relation to the Epidemiology of Yellow Fever in Uganda.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Oct., v. 45, No. 2, 189–224, 4 figs. [48 refs.]

This important communication summarizes observations, involving more than 10 years of field work, on the prevalence of antibody neutralizing yellow

fever virus in Uganda monkeys. In all cases the presence or absence of such antibody was determined by the intraperitoneal mouse-protection test, and the sera were considered protective if not more than one mouse died in any group. A total of 1,069 wild monkeys was tested, including 16 different species, and over 40 per cent. gave positive protection tests. About half the area of Uganda was covered, and with the single exception of the Ruwenzori Mountain Forest, immune monkeys were found in all the districts adequately sampled. The highest rates (about 60 per cent.) occurred in the inhabited areas of the Bwamba Forest, in the Toro District and in parts of Masaka and Mengo Districts. The only outbreak of epizootic yellow fever occurred in Bukasa Island in the Sesse Group in 1943, and perhaps on Kome Island, Lake Victoria, and apart from this the disease is enzootic, either constantly present or most probably recurring at frequent intervals. The observations support the view that in Uganda yellow fever is essentially a disease of monkeys transmitted by an arboreal vector, *Aëdes africanus* [this *Bulletin*, 1949, v. 46, 823]. The vector of the human disease was already known to be *Aëdes simpsoni* [see MAHAFFY *et al.*, *ibid.*, 1942, v. 39, 759].

Four species of monkeys were sufficiently numerous for detailed discussion, *viz. Cercocebus albigena johnstoni* (Black or Johnston's mangabey) ; *Cercopithecus aethiops centralis* (Grivet monkey) ; *Cercopithecus ascanius schmidti* and *Colobus abyssinicus ituricus*. The immunity rate in *C. aethiops centralis*, a mainly terrestrial monkey, was notably lower than those in the other three, which are either exclusively or mainly arboreal, and showed no significant difference in their immunity rates. Moreover, when all the monkeys examined were divided into 3 groups, arboreal, mainly arboreal and largely terrestrial in habits, the first two groups showed a significantly higher immune rate than the last group.

In Bwamba County no significant difference was found between the immunity rates of monkeys collected in the middle of a large uninhabited rain forest, those collected round the forest edge, and those collected in the inhabited area adjoining the forest.

A study of immunity by age-group showed that it is high just after birth, then falls sharply in juveniles, after when it begins to rise, reaching its highest level in the oldest age-group. The main rise was found to occur at different times according to the species. Thus in *C. abyssinicus ituricus* it occurred in the adult age-group, and in *C. ascanius schmidti* in the sub-adult age-group.

It is suggested on theoretical grounds that there may be a diurnal arboreal vector of the monkey disease in addition to the known nocturnal vector *Aëdes africanus*. Also in some areas it does not seem possible for the disease to be maintained from monkey to monkey and new infection must either be introduced by wind-borne mosquitoes or there may be an unknown arthropod reservoir of the virus.

The authors give a useful list of the species of monkeys which have been under examination, as their nomenclature in some cases differs from that in G. M. ALLEN's Check-list. *E. Hindle*

GARCÍA, E. Brote de fiebre amarilla selvática en Santo Domingo de los Colorados, Ecuador. [**Outbreak of Jungle Yellow Fever in Santo Domingo de los Colorados, Ecuador**] *Bol. Oficina Sanitaria Panamericana*. 1951, Oct., v. 31, No. 4, 340–49, 1 map, 1 plan & 1 chart. [11 refs.] English summary.

For some years past, from 1944 in fact, yellow fever had been suspected in this district of Ecuador. In that year, patients were observed who died after illness characterized by fever, black vomit and jaundice. Subsequent tests

of sera and liver sections were, however, negative till, in 1949, a black boy, 12 years of age, was seen who had " three days' fever, slight jaundice and coffee-coloured vomit ". His blood showed no malaria parasites. In the Napo district, however, 120 blood samples of young persons were tested and 15 per cent. were found to be protective. Then, early in 1951, the present outbreak occurred in the Province of Pichincha at Santo Domingo de los Colorados, 128 kilometres west of Quito. The water supply is from a small river and it is stored in domestic receptacles ; but *Aëdes aegypti* was not found. The area is well wooded with many rubber trees and plantations of banana, coffee and maize. The people live among unhealthy conditions ; their dwellings are mere shacks, often without walls, leaving them exposed to insects. Five species of monkeys occur : *Ateles fusciceps, A. belzebuth, Allouatta palliata aequatorialis, Cebus capuchinus* and *C. albifrons aequatorialis*, several of which were found dead.

The human outbreak started at the end of January 1951 when an agricultural worker, 25 years of age, was taken ill with high fever, jaundice, haematemesis and black vomit and died on the 9th day. During the two months, 27th January to 21st March there were 53 cases, 19 fatal ; one case in January, 22 in February (9 fatal), 30 in March (10 fatal). Forty-eight of the patients were agricultural workers, one was a wood-sawyer and 4 were domestics ; 7 were between 15 and 19 years of age, 23 (the largest number) were between 20 and 29 years, 5 between 30 and 39, 2 between 40 and 49, 3 were over 50 years ; the ages of 13 were not known.

Forty-seven presented a typical clinical picture of fever, albuminuria, black vomit and jaundice ; only one had malaria parasites, *P. vivax*, in his blood. Mosquitoes caught included *Haemagogus, Aëdes* and *Anopheles*, but their identification is not yet completed ; it is stated that *Aëdes aegypti* is not one of them. In fact, it is stated that no mosquitoes were caught in the dwellings and all those attacked had come from outside districts to work.

H. Harold Scott

Blaksley, J. C., del Ponte, E. & Bejarano, J. F. R. Nuevas adquisiciones epidemiológicas sobre la fiebre amarilla selvática en el Noroeste Argentino. [**New Epidemiological Developments on Jungle Yellow Fever in Northern Argentina**] *Bol. Oficina Sanitaria Panamericana.* 1951, July, v. 31, No. 1, 39–45, 5 maps. English summary.

In 1940 serological examinations revealed the presence of yellow fever antibodies in 5 people in the Territory of Misiones, Argentina, which lies near the borders of Paraguay and Brazil ; these people had not received vaccine. In 1948 a patient from the same area died from hepato-nephritis, and post-mortem examination showed that the cause of death was yellow fever. Protection tests about that time again showed evidence of the disease in that and neighbouring areas, and it is recorded that deaths from hepato-nephritis which might have been due to yellow fever have occurred in the past 10 years.

Investigations showed that this area is in the zone in which there are monkeys and marsupials in which yellow fever virus can persist, and the presence of *Haemagogus* and *Aëdes* mosquitoes capable of transmitting the virus was confirmed.

Charles Wilcocks

Floch, H. & Abonnenc, E. Sur la présence d'*Aëdes aegypti* dans une région isolée au coeur de la Guyane française. [*Aëdes aegypti* **in an Isolated Region in the Centre of French Guiana**] *Arch. Inst. Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 223.* 1951, Jan., 4 pp., 1 fig.

Mosquito catches during March 1944 in and around the village of Saül in the centre of French Guiana yielded 17 species but not *Aëdes aegypti*. In 1946,

only *Culex allostigma* and *C. mollis* were found in domestic utensils suitable to *Aëdes aegypti*. But in 1948, *Aëdes aegypti* adults were taken in the area. The paper discusses how this mosquito was reintroduced to this isolated village of about 300 inhabitants. Merchandise is brought by canoes to within 20 kilometres of the village and carried on men's backs for the remainder of the distance. It is considered that the eggs of the mosquito in empty water jars, habitually carried by travellers, were responsible for its reintroduction. No more adults were taken in the village a month after DDT treatment in September 1950. *D. S. Bertram*

See also p. 236, Floch, Lutte antiamarile et lutte antipaludique en Guyane française. Quelques resultats enregistrés à ce jour. [**Current Results of Control Measures against Yellow Fever and Malaria in French Guiana**]

Strode, George K. [Editor] & others. **Yellow Fever.**

This book is reviewed on p. 337.

DENGUE AND ALLIED FEVERS

Taniguchi, T., Fujino, T., Inoki, S. & Okuno, Y. **Studies on the Experimental Inoculation of Dengue Fever.** *Med. J. Osaka Univ.* 1951, Mar., v. 2, No. 2, 1–36, 15 charts & 12 figs. on 4 pls. [32 refs.]

Numerous experiments are described on the inoculation of animals with the blood of dengue patients.

In monkeys (*Macacus* sp.) inapparent infection was caused but this could be demonstrated only by inoculation of human volunteers with the blood of the infected monkeys.

Large numbers of mice were inoculated by the intracerebral route ; the usual result was the production of encephalitic paralysis. In successive passages the virulence was sometimes diminished, sometimes increased, and occasionally it became fixed. The mouse-passage virus caused typical attacks in volunteers. A mouse-protection test on the lines of the yellow-fever test was devised. Guineapigs were susceptible to the mouse-passage virus but repeated passage was not possible. Rabbits and white rats were less susceptible to the mouse-passage virus and the results were very irregular.

In yolk-sac cultures the changes described by Shortt and other workers were observed but the authors are doubtful regarding their significance.

John W. D. Megaw

RABIES

Bieling. Die Tollwut hat auf Deutschland übergegriffen. [**Rabies has been reintroduced into Germany**] *Deut. Med. Woch.* 1951, Nov. 16, v. 76, No. 46, 1473–4.

Rabies has again become a problem of Central Europe. In 1945 an epizootic was introduced into southern Austria from Yugoslavia, chiefly affecting dogs and other domestic animals. Independently rabies was reintroduced from the north into Austria in late 1948, this time predominantly propagated among wild animals such as foxes and badgers. The same happened in Eastern Germany, rabies becoming prevalent as far west as Thuringia again, and since spring 1951 also affecting Bavaria.

As the principal counter measure mass vaccination of dogs has been found to be effective, the attenuated live vaccine developed in Hungary being generally recommended. Such campaigns are, according to reports given at the Danubian Rabies Conference (Budapest 1948), planned or in the course of being carried out, in Bulgaria, Yugoslavia, Hungary, Slovakia, and parts of eastern Austria.

Up to the present, cases reported among wild-life in northern Austria have not diminished and it is from there that the disease has in all probability been reintroduced into Bavaria.

Hempt's vaccine is generally employed in the Eastern and Central European countries affected by the epizootic for treatment of human beings, as it permits decentralization and requires only 6 consecutive injections and an additional one after 4 weeks. *C. Klimt*

Remlinger, P. & Bailly, J. Un cas de rage furieuse chez un lapin de clapier domestique. [**A Case of Furious Rabies in a Domestic Rabbit Kept in a Hutch**] *Maroc Méd.* 1951, July, v. 30, No. 314, 613–15. [14 refs.]

In France rabies has disappeared to such an extent that the closure of several antirabies institutes has been advocated. In Morocco, on the other hand, the numbers of cases in animals have recently sharply increased. In the region of Fez during the first five months of 1951, 204 animals have been found rabid and one, possibly two, human beings.

A domestic rabbit, kept in its cage at all times, to which dogs had no accesss but rats possibly had, developed furious rabies. After it had bitten two of its stable mates to death it had to be sacrificed. Intracerebral injection of its brain caused furious rabies in both rabbits and guineapigs.

The authors are of the opinion that only the rat could have transmitted the disease and cite from the literature instances in which rats were tentatively incriminated. They alternatively discuss the possibility of spontaneous creation of the rabies virus from normal host cells. *C. Klimt*

Remlinger, P. & Bailly, J. Rage clinique expérimentalement constatée chez un lapin domestique. [**Clinical Rabies Demonstrated Experimentally in a Domestic Rabbit**] *Ann. Inst. Pasteur.* 1951, Sept., v. 81, No. 3, 311–12.

This appears to be the same incident as that described above.

Hottle, G. A., Morgan, C., Peers, J. H. & Wyckoff, R. W. G. **The Electron Microscopy of Rabies Inclusion (Negri) Bodies.** *Proc. Soc. Exper. Biol. & Med.* 1951, Aug., v. 77, No. 4, 721–3, 4 figs. [11 refs.]

Mice, infected with street virus, were sacrificed after 7, 9 and 12 days respectively. Sections of the hippocampus were examined under the light microscope. From parts of tissue containing Negri bodies small blocks, 1 by 2 mm., were cut out after the paraffin had been removed with xylol. These blocks were embedded in methacrylate and thin-sectioned for the electron microscope. Thicker sections were also made for optical control examination. In these the methacrylate was removed by acetone after which they were stained with azure eosin. This procedure did not seem to change the appearance of cells with the exception that they now did not stain as intensively with eosin as they did in paraffin sections.

In the sections from the mice sacrificed after 7 and 9 days, structures have been found, which are absent in normal mouse brain, believed to be various developmental stages of the Negri body. They are located close to the nucleus. At first they are not sharply separated from the protoplasm ; later they appear more clearly defined and possess a distinct vacuole. Developed Negri bodies

show multiple vacuoles and poorly defined granules ("*Innenkörper*"). No uniform structure resembling the postulated one for rabies virus (spheres with an approximate diameter of 100 to 150 millimicrons) could be recognized.

C. Klimt

PLAGUE

LARSON, C. L., PHILIP, C. B., WICHT, W. C. & HUGHES, L. E. **Precipitin Reactions with Soluble Antigens from Suspensions of *Pasteurella pestis* or from Tissues of Animals Dead of Plague.** *J. Immunology.* 1951, Oct., v. 67, No. 4, 289–98.

Details are given of a precipitin test by which it is possible to demonstrate the presence of specific, soluble, heat-labile, antigens in suspensions of *Pasteurella pestis* or of the organs of animals which have died of plague. The test was positive with suspensions of organs stored at 37°C. for as long as 14 weeks and so would be applicable to animals found dead in the field. The reagent employed was anti-plague serum. False positives occurred with animals infected with *P. pseudotuberculosis* but this source of fallacy was eliminated by absorbing the serum with this organism. False positives occurred also with suspensions of *P. multocida* and *Br. tularensis* but these could be excluded by using suitably absorbed serum. The test is easy to carry out and little equipment is needed. *John W. D. Megaw*

ESKEY, C. R., PRINCE, F. M. & FULLER, F. B. **Double Infection of the Rat Fleas *X. cheopis* and *N. fasciatus* with *Pasteurella* and *Salmonella*.** *Pub. Health Rep.* Wash. 1951, Oct. 12, v. 66, No. 41, 1318–26.

Rat fleas (*Xenopsylla cheopis* and *Nosopsyllus fasciatus*) in some cases became infected with *Pasteurella pestis* and *Salmonella enteritidis* or *Salm. typhi-murium* after feeding successively on mice experimentally infected with these organisms. Some of the doubly-infected fleas were able to transmit one or other of the infections by their bites ; in a few cases they could transmit both infections, but their ability to transmit plague was much less than that of fleas infected with plague alone.

Fleas naturally infected with salmonellosis were often found on domestic rats and on various wild rodents in the western states of the U.S.A. so that epizootics of this infection may control the spread of plague among these animals. It is mentioned that blockage of the stomach was found to have occurred in all the doubly-infected fleas that transmitted plague infection and that *X cheopis* was found to be a much more effective vector of plague than *N. fasciatus*. *John W. D. Megaw*

BARNETT, S. A. & SPENCER, Mary M. **Feeding, Social Behaviour and Interspecific Competition in Wild Rats.** Reprinted from *Behaviour.* 1951, v. 3, No. 3, 229–42, 2 text figs. (1 folding) & 4 figs. on 4 pls. [22 refs.]

CHOLERA

NAGAO, I. **Studies on the Antibiotic Substances from Actinomyces. (13th Report.)** *Tohoku J. Exper. Med.* 1951, Aug. 25, v. 54, No. 3, 268.

" Ishida of our laboratory has isolated a new basic streptothricin-like, but non-toxic substance ' Reseomycin ' from a strain of *Streptomyces roseochromogenus*. This substance shows a higher activity against *Vibrio comma* than

streptomycin in vitro, as well as in vivo. The author made a comparative study, dealing with the activities of roseomycin, streptomycin, chloromycetin, sulfathiazole and malfanil against *Vibrio comma*, in vitro, and roseomycin, chloromycetin and malfanil in mice inoculated with this organism and obtained following results :

" (1) Against 10 strains of *Vibrio comma*, these substances were effective in vitro in the following order : Chloromycetin, roseomycin, sulfathiazole, malfanil, and streptomycin.

" (2) In experimental infections, roseomycin and chloromycetin showed a similar effect."

KANT, L. **An Assessment of the Value of Cholera Vaccine as used in a Single Dose Mass Inoculation. (A Field Observation.)** *J. Trop. Med. & Hyg.* 1951, Nov., v. 54, No. 11, 223–5.

The results are reported of an anti-cholera inoculation campaign in the district of Darbhanga, Bihar, in which a single dose of 8,000 million vibrios was employed. The population involved totalled 52,806, in 49 villages, of whom 30,682 were inoculated. Inoculation was not commenced until after the onset of the first case in a village.

There were 1,716 attacks, of which 809 occurred before the commencement of routine inoculation and 907 after. The deaths in the two groups were 393 and 427 respectively. In Table II, which presumably refers to the period after commencement of routine inoculation, the following incidence of attacks and deaths is shown :—

	Inoculated	Uninoculated
Number	30,683	22,124
Attacks	257	650
Percentage attacks	0·84	2·94
Deaths	89	338
Per cent. deaths among persons attacked	34·6	52

The deduction is made that " inoculated persons were 3·5 times safer than the uninoculated ones ".

Out of 257 attacks in inoculated persons, 246 occurred on the day of inoculation or on the subsequent three days, and it is concluded that significant immunity develops four days after inoculation.

Highest incidence and high case-mortality were shown in young persons up to 10 years of age. Males were more frequently attacked than females.

[The Editorial which precedes this paper should be read in connexion with it. It is correctly pointed out that as 809 cases of cholera had already occurred before the inoculations were started, the inoculation campaign was superimposed on a declining epidemic. The difficulties in making an estimate of the value of inoculation under such conditions are well known. Any calculations on the crude figures presented might be misleading and it is very doubtful whether they can be accepted as a reliable basis.] *J. Taylor*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

Tobie, J. E., Reardon, Lucy V., Bozicevich, J., Shih, Bao-chih, Mantel, N. & Thomas, Elizabeth H. **The Efficiency of the Zinc Sulfate Technic in the Detection of Intestinal Protozoa by Successive Stool Examinations.** *Amer. J. Trop. Med.* 1951, Sept., v. 31, No. 5, 552–60, 1 fig.

The authors have carried out 684 examinations of stools from 243 patients of a mental institution in New York State, using the zinc flotation technique in all cases, and direct smears (unstained and iodine-stained) in 471 cases. A comparison is made of the efficiency of these methods in the detection of intestinal protozoal infections, while the probability of detecting a particular parasite in successive stools from an infected person was determined by repeated (5) examinations of 28 patients known to be infected with *Entamoeba histolytica*, the flotation technique being used. The great majority of patients were cyst-passers.

The flotation method for the concentration of cysts described by Faust *et al.* [this *Bulletin*, 1939, v. 36, 144] has been simplified as follows : a portion of faeces about as large as a pea is placed in a Wassermann tube (13×100 mm.) and teased up in 3–4 ml. of tap water, after which the tube is shaken vigorously. It is then filled with water up to 1 cm. from the top, and inverted to produce an even suspension. The tube is centrifuged at 2,500 r.p.m. for 1 minute, and the supernatant fluid is poured off. About 1·5 ml. of water is added to and thoroughly mixed with the sediment, after which the tube is topped with water to within 1 cm. of the top and again inverted to produce a suspension. This is re-centrifuged and decanted 2 or 3 times until the supernatant fluid is clear. To the resulting sediment are added 1·5 ml. of zinc sulphate solution (sp.gr. 1·180) with which the sediment is thoroughly mixed, and finally more zinc sulphate solution is added, until it is within 0·5 cm. from the top of the tube, after which it is centrifuged as before. With a wire loop (5 mm. diameter), 3–4 loopfuls of material are removed from the surface film and placed on a slide, and one drop of d'Antoni's iodine stain [this *Bulletin*, 1938, v. 35, 455] is added to the preparation, after which it is mounted under a coverslip and examined microscopically.

The examination of the stool specimens of the patients—in direct smears, in flotation preparations, and in a combination of these methods—revealed infections with the following protozoa : *Entamoeba histolytica, E. coli, Endolimax nana, Iodamoeba bütschlii, Chilomastix mesnili* and *Giardia intestinalis*. In the case of *E. histolytica*, the efficiency of the direct smears was 27 per cent., of the flotation method 59 per cent., and of the two techniques combined 62 per cent., thus demonstrating the superiority of the zinc sulphate technique. In the series of examinations of patients known to harbour *E. histolytica*, 71 per cent. infections were detected on the 1st examination, 82 per cent. on the 2nd, 86 per cent. on the 3rd, 96 per cent. on the 4th, and 100 per cent. on the 5th. The results for the other intestinal protozoa are presented in tabular form.

C. A. Hoare

Ricci, M. Sulla diffusione delle parassitosi intestinali in un piccolo centro siciliano. [**Incidence of Intestinal Parasites in a Small Sicilian Town**] *Riv. di Parassit.* Rome. 1951, Oct., v. 12, No. 4, 233–9.

The English summary appended to the paper is as follows :—

" The author has examined for parasites the stools of 164 subjects of the town of Montemaggiore Belsito (Palermo). Of these subjects, whose age ran from 16 months to 83 years, 91 were males and 73 females.

"The parasites found and their frequency are the following: *Entamoeba coli* (10·97%), *Entamoeba histolytica* (3·04%), *Iodamoeba bütschlii* (9·75%), *Retortamonas* [*Embadomonas*] *intestinalis* (1·82%), *Chilomastix mesnili* (0·60%), *Giardia intestinalis* (17·68%), *Hymenolepis nana* (16·46%), *Ascaris lumbricoides* (3·04%), *Enterobius vermicularis* (6·09%), *Trichuris trichiura* (12·80%).

"The author has made a detailed study of the variations of the parasites' species and of their frequency in the two groups; subjects below and subjects above 20 years of age. The same study was also made on children from 1 to 12 years old.

"The author finally reports on the type of the parasitic associations, and on their relative frequencies, of 36 cases of infestations by two or more parasites."

Rizzotti, G. & Neri, P. Forme dissenteriche osservate nell'Imperial Ethiopian Medical Research Institute di Addis Abeba durante gli anni 1948, 1949 e 1950. [**Forms of Dysentery seen during 1948–1950 in the Imperial Ethiopian Medical Research Institute, Addis Ababa**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1951, June, v. 32, No. 6, 594–601, 1 chart. English summary.

The faeces have been studied microscopically in 251 cases, of which 143 were diagnosed bacillary dysentery, 71 amoebic dysentery, 3 mixed, 6 *Strongyloides* dysentery and 1 *Balantidium* dysentery: in the remaining 27 cases the aetiology of the disease could not be ascertained. Each patient had had at least 5 stools in 24 hours at the time of the clinical and laboratory examinations and had not taken any laxatives, intestinal irritants or other drugs which could account for the looseness of bowel. Every patient showed abdominal pain and the discharge of blood and mucus.

Bacillary dysentery had its peak of incidence each year in May and June towards the beginning of the rainy season, which is also the hottest time of the year.

J. Cauchi

Rao, V. G. **Sterilization of Cysts of *Entamoeba histolytica* by Chemical Disinfectants, and Initiation and Maintenance of Pure Cultures in association with Single Species of Bacteria.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Apr., v. 44, No. 5, 593–604. [20 refs.]

After a detailed review of the attempts by previous workers to cultivate *Entamoeba histolytica* without bacteria, the author describes his own method for freeing the amoebae of concomitant bacteria and growing them in the presence of a selected microorganism.

For this purpose, cysts of *E. histolytica*, either produced in culture or isolated from faeces, were treated chemically with the following disinfectants; (1) hydrochloric acid N/20; (2) 0·002 per cent. mercuric chloride solution in distilled water (1 : 50,000); (3) 0·02 per cent. potassium permanganate solution in distilled water (1 : 5,000); and (4) 0·02 per cent. acriflavin solution in distilled water (1 : 5,000). Solutions 2, 3 and 4 were autoclaved at 1½ atmospheres for 20 minutes, and the fluids (distilled water and saline) used for washing the cysts were similarly treated.

Cultures containing cysts were left at room temperature for 2 days, after which they were kept at 4°C. for a week. Finally the cysts from 6 tubes were pooled and washed thrice by centrifuging in distilled water. To the deposit were added 10 ml. of $HgCl_2$ solution, the fluid was mixed and left to stand at room temperature for 45 minutes. The mixture was then centrifuged for 10 minutes, the deposit was suspended in sterile distilled water and washed. After this, the deposit was suspended in potassium permanganate solution, mixed and left for 15 minutes; it was then washed twice with sterile distilled

water, and suspended in acriflavin, mixed and allowed to stand overnight. The resulting deposit was washed twice in sterile saline, and 1 ml. saline was added to it, to make a uniform suspension of cysts. These were used for inoculation of liver infusion agar medium, which had been seeded 24 hours previously with one of the following bacteria ; *Bact. coli* or *Chromobacterium prodigiosum*. The seeded tubes were inoculated with 0·5 ml. of the cyst-suspension, with addition of a loopful of rice starch, and incubated at 37°C. After 48 hours the tubes with *Bact. coli* showed trophozoites of *E. histolytica* but no cysts, while the tubes with *Chr. prodigiosum* showed trophozoites after a week. In the control tubes—without bacteria—the cysts failed to hatch. These strains of *E. histolytica* were successfully maintained in subcultures with the single species of bacteria originally introduced.

In the case of stools containing cysts of *E. histolytica* the procedure was as follows : the faeces were emulsified and washed repeatedly by centrifugation in distilled water. The deposit was treated with N /20 HCl for 75 minute at 37°C. and the acid was neutralized with N /20 NaOH ; it was then washed twice, and treated with $HgCl_2$ solution for 45 minutes at room temperature and then for 30 minutes at 37°C., after which it was washed again, treated with potassium permanganate for 45 minutes at room temperature, washed and suspended in acriflavin, where it was left overnight at room temperature. After washing in saline, the final deposit was suspended in saline, and the cyst-suspension was inoculated into the culture media, seeded as previously with *Bact. coli* or *Chr. prodigiosum*. *E. histolytica* grew well in both cultures, which were maintained through serial transfers.

In the monobacterial cultures obtained by these methods the amoebae grew profusely up to 3 days, after which they declined in numbers. Bacteriological examination of the cultures demonstrated the absence of "any contaminating bacteria, aerobic or anaerobic, other than the single species introduced". *C. A. Hoare*

YANAI, T. **On the Influences of *Escherichia coli* upon the Experimental Infection of *Entamoeba histolytica* in Rats.** *Kitasato Arch. Exper. Med.* 1951, Jan., v. 23, No. 3, 21–7. [14 refs.]

The author reports the results of experimental infection of rats with *Entamoeba histolytica* accompanied by *Bacterium coli*. The bacteria—belonging to the *coli* and *metacoli* types—were isolated from a healthy person, while the amoebae were recovered in culture from a convalescent carrier. In one set of experiments, rats were inoculated intracaecally with mixed cultures of *E. histolytica* and *Bact. coli* (*coli*) in one group, and *Bact. coli* (*metacoli*) in another, whereas control rats were infected with the amoebae alone [but presumably also with the concomitant flora]. It was found that in rats infected with *metacoli* bacteria, the percentage of infections and ulcers was higher than in the controls, but those infected with the *coli* type did not differ from the controls. In another set of experiments, *metacoli* bacteria were given in food to rats for 10 days in succession, and *E. histolytica* was introduced into them after 4 days : in one group, intracaecally in the form of free amoebae ; in another, *per os* in the form of cysts. While the effect of intracaecal inoculation was similar to that of the simultaneous caecal inoculation of the amoebae+*metacoli*, the results of peroral inoculation of these bacteria with amoebic cysts did not differ from those in the control animals. It is concluded that the effect of the *metacoli* type of *Bact. coli* upon the virulence of *E. histolytica* is more marked when the bacteria are introduced directly into the caecum. An account is also given of the histopathology of the ulcerated caecal wall, which is similar in both the experimental and control rats. *C. A. Hoare*

Abd El-Ghaffar, Y. & Abd El-Ghaffar, M. **A Study of the Bacterial Flora in Amoebic Infections of the Intestines.** *J. Roy. Egyptian Med. Ass.* 1951, v. 34, No. 8, 530–40. [11 refs.]

The technique consisted in emulsifying 1 gm. of fresh stool in 10 cc. sterile saline. After sedimentation for 30 minutes the supernatant fluid is decanted and centrifuged at low speed for one minute, a process which is repeated again at higher speed (3,000 r.p.m.) for 10 minutes. The sediment is suspended in 2 cc. nutrient broth, incubated at 37°C. for three hours and then spread on MacConkey's and plain nutrient agar plates.

The flora of 40 cases of amoebic infection of the bowel, of 41 cases of non-amoebic affections and of 10 normal cases was investigated. The diet in each case was standardized, while cultures were made aerobically and, in some instances, anaerobically. No material difference was found between the flora in the amoebic cases and that of the non-amoebic and normal cases ; but the rise in the proportion of enterococci in some cases of diarrhoea of both amoebic and non-amoebic origin was probably due to migration of these organisms from the small to the large intestine. It is reasonable to suppose that the organisms concerned in the pathology of amoebiasis are just those which are present in the stools, probably *Bact. coli* and para+colon bacilli.

Philip Manson Bahr

Dolkart, R. E., Halpern, B. & Cullen, Jeanne. **The Diagnosis of Amebiasis, the Role of the Complement Fixation Test, and the Incidence of the Disease in the Chicago Area.** [Abstract.] *J. Lab. & Clin. Med.* 1951, Nov., v. 38, No. 5, 804.

" Since 1946, 2,836 patients have been studied for the presence of amebiasis. This group represents a selected population sample referred to the laboratory because of the presence of active gastrointestinal tract symptoms or fever of undetermined origin. Rigid criteria of identification were employed requiring the positive identification of characteristic cysts, or the identification of trophozoites as *Endamoeba histolytica*, only if by special treatment of the stools, encystment was produced. 7·33 per cent of the patients studied were found to be infected. A correlation of the frequency of identification with the number of stool specimens studied per patient showed that in 55 per cent of instances the diagnosis was made on the first specimen examined, and 97 per cent by the time three specimens were examined.

" Complement fixation tests were performed by the National Institute of Health on 458 of the patients studied. Sixty of these patients had positive stools. Nineteen patients had both positive stools and positive complement fixation tests ; forty-one patients had positive stools and negative complement fixation tests ; one hundred six patients had positive complement fixation tests and negative stools. It is concluded that there is no specific correlation between the complement fixation test and the stool examination which gives constructive value to the component fixation test as a diagnostic procedure."

Fischer, O. Die Klinik der Amöbenruhr und ihrer Folgeerscheinungen. [**Clinical Features of Amoebic Dysentery and its Complications**] *Vorträge a. d. Praktisch. Med. No. 27.* Stuttgart. [Enke.] 1950. 42 pp., 8 charts.

Professor Otto Fischer has written a concise and easily intelligible account of amoebic dysentery as it has occurred in his extensive experience. It contains no novel or outstanding facts and in this respect this statement does not lend

itself to abstraction. It is illuminated, quite extensively, with illustrative cases culled from experiences gained during the Second World War. Several indigenous cases encountered in Germany are cited.

Curious readers will turn to the section on treatment. Preference is given to the quinoxyl group, especially to enterovioform and yatren. As side effects urticarial manifestations and erythrodermia are cited.

Emetine therapy is briefly discussed, but undue emphasis appears to have been paid to its shortcomings. It must be admitted that this section is rather disappointing.

On the question of prophylaxis, some weight is given to yatren, 2 pills twice weekly. *Philip Manson-Bahr*

Arch. Ital. Sci. Med. Trop. e Parassit. 1951, Apr.-May, v. 32, Nos. 4/5, 223–563, 8 figs. [Numerous refs.] Atti del VII Congresso Nazionale di Medicina ed Igiene Tropicale e Subtropicale. Montecatini Terme 11–12 Giugno 1950. [**Seventh National Congress of Tropical and Subtropical Medicine and Hygiene Held in June 1950, at the Spa of Montecatini.**]

Amoebiasis provided the main theme of the Congress and papers were read on (i) Clinical Problems in Amoebic Infection (not including Liver Amoebiasis), by Iacono of Naples ; (ii) The Liver and Amoebiasis, by Cannavo and Caruselli of Messina ; (iii) The Public Health Problem in Amoebiasis, by Mazzeo of Naples.

Iacono stresses that amoebiasis now has a cosmopolitan distribution and this spread has been helped by the rapid developments of international traffic and the intermingling of races during the two world wars. The ingested cysts of *E. histolytica* develop into vegetative forms, generally in the ileo-caecal part of the bowels, as early as 24 hours after they have been swallowed. Development of infection is dependent on such factors as individual susceptibility, dose of infective material and strains of the organism. Race and climate may affect the issue. Iacono doubts the existence of healthy carriers though the lesions in symptomless excreters may not be apparent even at post-mortem, unless this includes microscopical examination. Clinical classification, in relation to the morbid anatomical changes, is discussed, and cases of spread to various organs, or systems, other than the alimentary, are dealt with. Laboratory results must not be judged without careful consideration of clinical signs and symptoms. A whole range of remedies is reviewed in dealing with treatment.

Cannavo and Caruselli discuss the aetiology of amoebiasis of the liver in its various forms ; they are inclined to believe that colliquative hepatitis (liver abscess) is invariably amoebic. The morbid anatomy and clinical forms of amoebiasis of the liver are dealt with and the authors touch upon certain functional liver changes which may be found in amoebiasis without a strict localization of the disease in the liver : these sometimes occur or persist after all evidence of amoebic infection has disappeared. Some of these patients have been made worse by emetine and arsenic given against an amoebic infection which is no longer present.

Mazzeo enumerates various cases of amoebiasis, which have been recorded as far back as 1890 and since, in persons who had never left their own native land, in which the disease is not indigenous ; in many of these cases there was no evidence of any connexion, even indirect, with endemic areas. Unlike Iacono, Mazzeo postulates the existence of healthy, perhaps only temporary, carriers who themselves suffer no damage by the parasite. He is inclined to favour Reichenow's theory that *Entamoeba minuta* is the " normal ", typical, form of the parasite and may go on multiplying in the bowel without giving rise

to any lesions. This form may become encysted on the one hand, or it may become virulent, perhaps during a weak phase in the host's health, attack the tissues, ingest blood corpuscles and give rise to dysentery. Mazzeo deals, more fully than Iacono, with a wide range of laboratory techniques for the search of amoebic infection. The mode of spread of the disease is also dealt with.

An account is given of the discussion which followed on these papers and of their authors' replies.

In another paper read at the Congress by Prof. PULLE of Bologna, the author's case is that Napoleon Bonaparte died not of cancer but of a liver abscess which opened into the stomach.

Other communications to the Congress dealt with the aureomycin treatment of amoebic dysentery, amoebiasis in Cyrenaica, a survey of the parasitological examination of 20,000 specimens of faeces, the culture of *E. histolytica* and various other, including medico-legal, aspects of amoebiasis. The subjects covered by other communications include the epidemiology of adult leishmaniasis, haemoglobin exchange in leprosy and in malaria, streptomycin given intradermally for leprosy, thiosemicarbazone in leprosy, a note on leprosy in Palestine during the last 50 years, and a few more.

Since Italian emigration must mostly take place to tropical and sub-tropical countries, and whereas the chances of settlement of such emigrants in these countries depend on their physical fitness the Congress unanimously voted that such emigrants should be medically examined for their fitness to take up the new life and, in the case of mass emigration, groups of emigrants should be followed up for some time after settling and their mode of acclimatization and adaptation should be studied. Such a course is in the interest of the emigrants themselves and of production in their country of adoption, and it is advisable that such medical and further health work should be entrusted to those who have specialized in tropical medicine and hygiene. *J. Cauchi*

BUCCO, G. Osservazioni sulla patogenesi delle manifestazioni neuro-psichiche dell'amebiasi. [**Some Observations on the Pathogenesis of the Neuro-psychical Manifestations of Amoebiasis**] *Acta Med. Italica.* 1951, July, v. 6, No. 7, 188–91. [18 refs.] English summary (6 lines).

The author suggests the possible pathogenic mechanism which gives rise to neuro-psychological signs and symptoms in amoebiasis. He thinks that toxic factors are responsible, combined with an upset of the hormone equilibrium, some vitamin deficiencies, the calcium and oxalic acid levels, and the [lack of] balance between potassium and sodium in relation to calcium and magnesium, phosphorus in relation to calcium.

Such cases usually show, at the X-rays and by examination of the stools, the picture of an enterocolitis of either a putrefactive or a fermentative type. The symptoms are due to such processes of either putrefaction or fermentation, and not to the inflammatory and other pathological lesions which the amoebic infection may produce.

In some cases of amoebiasis these symptoms are limited to headaches and to a tendency to become easily tired and nervously exhausted. In other cases there is depression with a feeling of distress, a pessimistic outlook, excitability and some anxiety, heart palpitations and extra-systoles. Electro-cardiographic changes have been demonstrated in some cases. The conditions described are seen in cases of colitis, other than amoebic. The author hopes that the points raised, if kept in mind, should reduce the number of missed cases of amoebiasis.

J. Cauchi

Sullivan, B. H., Jr. & Bailey, F. N. **Amebic Lung Abscess.** *Dis. of Chest.* Chicago. 1951, July, v. 20, No. 1, 84–96, 12 figs. [17 refs.]

It is common knowledge that an amoebic infection of the liver may track into the pleura and lungs. The occurrence of amoebic lung abscess without other signs or symptoms of amoebiasis has infrequently been recorded. In 14 per cent. of 153 cases of pleuro-pulmonary amoebiasis Ochsner and de Bakey [*J. Thoracic Surgery*, 1936, v. 5, 225] considered the infection to have been haematogenous in origin and unassociated with a liver infection. Amoebae may be conveyed from the rectal haemorrhoidal veins by direct anastomosis to the inferior vena cava or, more probably, by the portal veins to the liver with the development of an amoebic abscess (possibly unrecognized), thrombophlebitis of some radicals of the hepatic veins, and dissemination of the amoebae into the inferior vena cava.

The symptoms and physical signs of amoebic lung abscess differ little from those of any other lung abscess ; cavitation is seen on radiography and may suggest tuberculosis. Absence of a history of intestinal amoebiasis and failure to identify the parasites in the stools do not exclude a diagnosis of amoebic abscess of the lung. A response to emetine treatment by it is suggestive of the diagnosis ; and the recovery of *Entamoeba histolytica* from the sputum establishes it conclusively.

Details of 4 cases of amoebic lung abscess are given. All the patients had lived for a time in the East ; all had abscesses involving the right lung ; only one had a proven intestinal *E. histolytica* infection ; *E. histolytica* was recovered from the sputum of one of the patients (not that in whom the intestinal infection was found). The diagnosis therefore was not proven in 3 of the 4 patients, but the striking therapeutic response of all of them to emetine was held to be of diagnostic significance. The complement-fixation test was done on serum from 3 of the patients ; it was positive in one of those from whom no parasites were recovered, it was repeatedly negative in another from whom parasites were recovered in the sputum, and it was negative in the third from whom no parasites were recovered ; the specificity of the test in such cases is therefore doubtful. One of the 4 patients, from whom no parasites were recovered, appeared to respond to aureomycin treatment given before a diagnosis was made and emetine treatment was started.

The general conclusion is reached that any patients with lung abscesses of unknown causation in whom there is not a satisfactory response to sulphonamide and antibiotic treatment should be treated with emetine before a resort is made to surgery. If there is a satisfactory response to the emetine treatment a diagnosis of amoebic abscess of the lung may be inferred. *A. R. D. Adams*

Ruggieri, G. & Cali', G. Su alcune rare complicanze dell 'epatite colliquativa amebica. [**Some Rare Complications of Amoebic Liver Abscess**] *Acta Med. Italica.* 1951, July, v. 6, No. 7, 182–7, 3 figs. [11 refs.] English summary.

In spite of the many advances in the means of diagnosis and specific treatment of amoebic abscess of the liver, cases still occur where the abscess extends into the surroundings, both below and above the diaphragm, and where emergency measures may be called for. An account is given of 3 such cases. In one of these, the amoebic abscess from the liver had opened into the pleural cavity with severe acute symptoms including those of shock. In a second case, invasion of the pleural cavity had developed more gradually until there had taken place a hepato-pleuro-bronchial fistula with copious expectoration of a chocolate-brown material with a greenish tinge due to bile. The third patient developed the signs and symptoms of an acute peritonitis due to an acute liver abscess

which had escaped diagnosis until then, and had opened under the diaphragm. The authors discuss the differential diagnosis of these cases which have to be treated as emergencies. *J. Cauchi*

LEY, H. L., SAYER, W. J., HOBSON, A. C. S., VANREENEN, R. M., TIPTON, V. J., FRICK, L. P., BALLARD, E. L. & TRAUB, R. **Aureomycin and other Antibiotics in the Treatment of Acute and Chronic Amebiasis.** *Antibiotics & Chemotherapy.* New York. 1951, Aug., v. 1, No. 5, 281–8. [16 refs.]

Twelve patients in Malaya suffering from amoebic dysentery with a history of acute exacerbations not more than a couple of months previously were given aureomycin 1 gm. orally each morning and evening for 13 or 14 days. The result was an early cessation of dysentery, followed by the disappearance of the causative parasites from the stools by the end of the course of treatment in every case. Of the 8 patients who subsequently were watched for periods up to 16 weeks thereafter 5 appeared to be free from parasites, but from the other 3, parasites were again recovered in the stools ; two of these 3 suffered from clinical relapse of their dysentery.

Sixteen patients in Washington, U.S.A., suffering from chronic amoebiasis, were treated with aureomycin. After an initial loading dose of 1·5 gm., 0·5 gm. was given orally every 6 hours for 10 to 14 days. In every instance the causative parasites vanished from the stools during the first 6 days of treatment ; 14 patients apparently remained free from parasites over observation periods of from 2 to 33 weeks ; the other 2 patients passed stools containing parasites 2 weeks and 6 months respectively after completion of the treatment. One of these latter patients was subsequently re-treated with aureomycin and no parasites were then recovered over a period of 4 months' observation. Four of these 16 patients with chronic amoebiasis prior to the aureomycin treatment had each been given a course of chloramphenicol treatment, without apparent action on their parasitic infections.

The effect of the treatment with aureomycin and with chloramphenicol on concurrent intestinal infestations with *E. coli. Endolimax nana, Iodamoeba bütschlii, Trichomonas hominis, Trichuris trichiura* and hookworm was noticed. Most of the commensal protozoal infestations appeared to be eradicated by aureomycin treatment, but the helminth infestations were unaffected by it.

The side-effects of aureomycin treatment in the dosage employed (2 gm. daily) were restricted to nausea, gastro-intestinal symptoms, and headache ; in three instances these were considered to be of a severity sufficient to require reduction of the daily dosage of the drug for a few days.

The aureomycin treatment of intestinal amoebiasis is encouraging in that it rapidly controls the clinical manifestations in acute cases, but it is by no means invariably effective in ensuring sterilization of the bowel infection. [It is not clear whether daily stool examinations of the patients were made ; the total numbers of stools searched in individual cases also are not stated.]

A. R. D. Adams

SCHNEIDER, J. & MONTEZIN, G. Étude, au laboratoire, de l'action de l'acide p-sulfamido o-aminophényl-arsinique sur l'amibiase expérimentale du rat. [**An Investigation of the Action of *p*-sulphamido-*o*-aminophenyl Arsinic Acid on Experimental Amoebiasis of the Rat**] Reprinted from *C. R. Acad. Sci.* 1951, v. 232, 2370–72.

The experimental methods of the authors used for infecting rats and observing the effect of drugs have been previously described [this *Bulletin*, 1949, v. 46, 259 ; 1951, v. 48, 265] and are based on those of JONES [*ibid.*, 1947, v. 44, 313].

They involved a comparison of the intestinal lesions and numbers of amoebae present in treated and untreated rats. The animals were given the drug for 4 days by mouth after infection and were killed on the eighth day. The drug named in the title showed negligible toxicity for the rat, a single oral dose of at least 10 gm. per kilo being tolerated without any untoward symptoms. Activity against the infection was shown by 1 /20 of this amount and doses of 1 /8 and larger cured all infected animals. Because of the large margin of safety noted in the rat, clinical trials on human patients have been initiated. *J. D. Fulton*

Santos, J. A. Aureomicina en el tratamiento de *Balantidiasis coli*. Informe preliminar. [**Aureomycin in the Treatment of Balantidiasis**] *Bol. Asoc. Méd. de Puerto Rico.* 1951, Sept., v. 43, No. 9, 482–4.

The author, writing from Arecibo, Porto Rico, presents this preliminary note primarily to recommend the use of aureomycin in the treatment of *Balantidium coli* infection. The greater part of this short paper is taken up with general observations on the parasite and its significance, but the author refers shortly, and without any detail, to 6 cases treated by him. He frequently meets this parasite, often accompanied by other intestinal parasites, especially in children. He has given aureomycin in doses of 100 to 250 mgm. every 6 hours, according to age and weight ; in some cases he treats the complicating parasitic infection first and then gives aureomycin.

In all the 6 cases referred to, he has found no *Balantidium coli* in the faeces after treatment as a result of repeated examination of 2 or 3 specimens at intervals of 15 days to a month. *H. J. O'D. Burke-Gaffney*

Pessôa, S. B. **Parasitologia Médica.** [Medical Parasitology]

This book is reviewed on p. 334.

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Trowell, H. C. **The Treatment of Tick-Borne Relapsing Fever in East Africa with special reference to Aureomycin.** *East African Med. J.* 1951, Oct., v. 28, No. 10, 402–12. [13 refs.]

As the author remarks, only a large series of cases, carefully controlled, and observed for at least a month or longer, can establish the claims of any drug to be specific.

In the series reviewed at Kampala this is impossible, as only some 20 cases of relapsing fever are seen in a year, and it is not practicable to keep such patients in hospital for a sufficient time to preclude the possibility of a relapse. According to the author it appears that aureomycin is almost a specific in the treatment of tick-borne relapsing fever. It is probable that quite small amounts, 1·0 to 2·0 gm., will completely cure most cases.

It is considered to be the general consensus that arsenicals are useless, if not dangerous, in the treatment of this disease. Penicillin appears to be of limited value in man. Large doses may help to cut short the fever but are ineffective in preventing relapses. There is some indication that streptomycin may give better results.

In Johannesburg in 1950, 25 cases of relapsing fever in African labourers were treated by Yeo with aureomycin and only 3 relapsed [this *Bulletin*, 1950, v. 47, 997].

In the series reviewed at Kampala, 26 cases, all showing spirochaetes in the peripheral blood, were observed. These were divided alternately into a control group receiving aspirin only and a group receiving aureomycin, cases not being selected for either group. Many relapses occurred in the controls, and two patients, both children and seriously ill, were transferred to the aureomycin group.

The first 3 patients were given an initial dose of 1·0 gm. of aureomycin and then 0·5 gm. every four or six hours. The response was so rapid that the total dosage was gradually reduced until finally one patient was given only 0·5 gm. and appeared to recover as quickly as any of the others, but unfortunately was under observation for only 7 days. The tables given show that aureomycin caused a rapid cessation of fever and disappearance of parasites from the blood within a few hours. One untreated patient died, and autopsy showed extensive hepatitis and necrosis of the liver. Another patient with signs of severe hepatitis recovered under aureomycin. Two treated patients also had neurological complications ; no spirochaetes were found, but the blood gave a positive complement-fixation test to *Trep. duttoni*.

Of the 13 cases in the control group, 8 were known to have relapses, the average duration of fever was 50 hours and spirochaetes were found for an average of 24 hours. In the 14 patients treated with aureomycin the average duration of the initial fever after commencing treatment was 11 hours and spirochaetes had usually disappeared within 3 hours. It is thought that the minimal effective dose of aureomycin is about 2·0 gm. or even less. No relapses were observed in the following afebrile period which in 11 cases exceeded 10 days. After the close of this investigation two more cases of relapsing fever were treated with only 0·5 gm. aureomycin, no relapse being noted within the next 8 and 10 days respectively.

As the author remarks, the periods of observation are much too short to preclude the possibility of relapse. [It is suggested that the author is perhaps too hard on the inefficacy and dangers of treatment with arsenicals. These impressions may be due to the following facts.

1. Tick-borne relapsing fever may vary greatly in virulence in different districts and in the strain of the spirochaete.

2. Treatment with arsenicals has not been sufficiently prolonged. Five or six injections should be given, treatment commencing the moment a diagnosis has been made and irrespective of the febrile condition at the time. A single injection is usually ineffective.

3. Up till quite recently most text-books recommended a single large dose (0·9 gm.), given at the height of the febrile paroxysm, as a specific. Such a dose at such a time may easily be followed by serious symptoms.]

C. F. Shelton

YAWS

Abreu Arredondo, C. La penicilina en la campaña contra la buba (frambesia) en Venezuela. [**The Use of Penicillin in the Yaws Campaign in Venezuela**] *Bol. Oficina Sanitaria Panamericana.* 1951, Oct., v. 31, No. 4, 365–7.

The preparation used by the author is procaine penicillin G in oily suspension with 2 per cent. aluminium monostearate, of a strength of 300,000 units per cc. ; two schemes of dosage were used, a single injection of either 1 or 2 cc. Of 43 patients in an early stage of disease so treated in May 1949, 19 were given 1 cc. (300,000 units) and 24 had 2 cc. (600,000 units). By the 7th day 3 had cicatrized

completely (2 on the 1 cc. and one on the 2 cc. dose), 29 more (14 on 1 cc., 15 on 2 cc.) by the 15th day, another 9 (1 and 8 respectively) by the 25th day ; the remaining two, who had received 600,000 units, showed improvement but not cure of their lesions. Re-examination of more than 5,000 persons in June and July of the following year revealed 9 fresh cases ; 42 of the previous 43 had remained well.

Epitomizing the results in this and other regions in which this form of treatment has been used (600,000 units as the dose for adults, younger persons according to age), 1,593 have been treated and 1,557 (97·7 per cent.) cured ; the remaining 36, who had open sores, had improved. *H. Harold Scott*

LEPROSY

Domínguez López, F. Datos breves sobre el censo de lepra en Camagüey. [**Short Notes on the Leprosy Census in Camagüey**] *Rev. Sifilografia, Leprología y Dermatología.* Marianao, Cuba. 1951, May, June, July & Aug., v. 7, No. 2, 96–100.

This is an account of a survey made in Camagüey, a province of Cuba. Nineteen towns were visited in company with the local doctors, and 224 cases were found of which 61·60 per cent. were lepromatous, the remaining cases being equally divided between uncharacteristic and tuberculoid forms. As regards race, 69·20 per cent. were white, 12·50 per cent. black, and 17·85 per cent. mixed ; 207 were Cubans. *Ernest Muir*

Ybarra Pérez, R. & González Prendes, M. A. Estado actual de los enfermos de lepra en la Provincia de Camagüey. [**Particulars of the Leprosy Patients in the Province of Camagüey**] *Rev. Sifilografia, Leprología y Dermatología.* Marianao, Cuba. 1951, May, June, July & Aug., v. 7, No. 2, 103–8.

These authors give more recent leprosy census figures for Camagüey. Up to date 342 cases have been found, but it is expected that by the time the examination of contacts is finished the number will be very much more. The standard of life is considered insufficient in 31·29 per cent. of cases. All but 1·75 per cent. go out to work, and of these 63 per cent. belong to the gravest and most infectious type of leprosy. A long list of occupations gives 133 (38·89 per cent.) as domestic workers. " In spite of the gravity of the problem of leprosy in Camagüey results are promising and fill us with hope when we see the number of patients who come seeking treatment at our dispensary, and we hope that the number will increase." *Ernest Muir*

Floch, H., Lecuiller, A. & Destombes, P. Sur l'emploi de la diaminodiphénylsulfone en suspension dans divers véhicules pour le traitement de la lèpre. [**The Employment of Diaminodiphenyl Sulphone Suspended in Different Vehicles for the Treatment of Leprosy**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 9/10, 522–6.

The authors consider that for some patients the oral administration of DDS is not ideal and prefer the once-weekly intramuscular injection of 1·2 gm. in suspension. This they consider gives more certainty of absorption. Four vehicles were tried out : normal saline, agar-saline, ground-nut oil, and the

ethyl esters of chaulmoogra oil. Each of the first three was made up in 10 cc. ampoules containing 1·2 gm. of DDS. The fourth contained 1·25 gm. in 5 cc. of the esters. With the oily suspension the absorption was very irregular, varying from a mere trace in the blood up to 25 mgm. per cent., while 24 hours later it was reduced to 0·22 mgm. per cent. This was due to the drug being stored up in former injection sites and then liberated irregularly. [Pure coconut oil suspension given subcutaneously does not form such " depôts " if the point of injection is well massaged immediately after the injection.] The ester suspension was better absorbed, and the agar-saline suspension was almost equally well absorbed. The normal saline suspension was intermediate between the latter two. Of the four the authors prefer the agar-saline as they find it very easy to prepare, and do not consider that the chaulmoogra esters add much to the value of the treatment. The agar-saline preparation is made by adding agar to normal saline in a water bath at 100°C. to produce a 0·125 per cent. solution, then grinding up the DDS in this solution. The suspension is made up to 100 cc. and contains 12 gm. of DDS. It is adjusted to *p*H 7·5, dispensed in 10 cc. ampoules (each thus containing 1·2 gm. of DDS) and sterilized in the autoclave at 110°C. for 20 minutes. [No comparison is given of the blood concentrations obtained by the oral and the injection methods.]

Ernest Muir

Floch, H., Lecuiller, A. & Destombes, P. Sur la sulfonémie après injections de suspensions huileuses de sulfone-mère. [**Sulphonaemia after Injections of Oily Suspension of Parent Sulphone**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 401–4.

This is a further discussion of a claim made by the authors [this *Bulletin*, 1951, v. 48, 742], that they had obtained a blood concentration on one occasion of 25 mgm. per cent. of DDS after giving weekly injections intramuscularly of 1·25 gm. suspended in chaulmoogra esters. This concentration represents a greater quantity in the total blood of the body than the amount injected at one time. The authors explain this anomaly by the retention of DDS at the sites of other previous injections, from which the drug is released irregularly, thus giving blood concentrations which vary over a wide range. *Ernest Muir*

Floch, H., Lecuiller, A. & Destombes, P. Est-il indifférent d'administrer la diaminodiphénylsulfone par la voie buccale ou par la voie intramusculaire ? [**Is it a Matter of Indifference whether Diaminodiphenyl Sulphone is Administered by the Oral or the Intramuscular Route ?**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 461–6.

After comparing the two methods it was found that, whereas by the intramuscular route DDS was recovered unchanged from the blood and urine, by the oral route an average of 80 per cent. remained as DDS, the rest having been changed into an unstable derivative. It is supposed that this transformation was due to DDS passing through the liver when given by the mouth. It was also found that the oral route was accompanied by 47 per cent. of lepra reactions as compared with only 8 per cent. by the intramuscular route. In the discussion which followed this paper Montel told of a patient who had been on 100 mgm. a day for a long time and had tolerated it well. He suddenly developed a severe attack of lepra reaction, and it was found on enquiry that he had of his own accord been taking 600 mgm. daily for the previous three days. After this severe reaction passed off, however, the lesions were very markedly improved.

Ernest Muir

Floch, H., Lecuiller, A. & Destombes, P. Sur le traitement sulfoné de la lèpre. Devenir de la succinyldiaminodiphénylsulfone, sulfone monosubstituée administrée *per os* dans l'organisme. Mode d'action. [**What happens in the Body to the Monosubstitute, Succinyldiaminodiphenyl Sulphone, when it is administered Orally**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 410–13.

This substance, otherwise known as 1500-F, was found to be transformed to a much greater extent when given by mouth than when injected either intravenously or intramuscularly. By the former only about 40 per cent. of sulphone recovered from the blood was 1500-F, whereas by the latter all but a mere trace was recovered as 1500-F. The authors contrast this with Cimédone [a substance similar to sulphetrone] which, when given orally, is still more broken down into DDS than is the monosubstitute 1500-F when given orally. They conclude that the sulphone monosubstitutes act principally by means of their own unchanged molecule. *Ernest Muir*

Wheate, H. **A Note on the Morphological Changes in the *Mycobacterium leprae* under Sulphone Therapy.** *Leprosy Review.* 1951, July–Oct., v. 22, Nos. 3/4, 79–80.

In addition to the changes in the morphology of *Myco. leprae* after sulphetrone treatment recorded by other workers, the author has noted two features in skin smears which suggest further investigation.

Firstly, the globi and smaller groups of bacilli seen in untreated cases tended, after 6 to 9 months' sulphetrone treatment, to be less circumscribed, less tightly packed, less numerous and smaller : the contained *Myco. leprae* showed irregular staining. On the other hand, single bacilli showed typical staining and were scattered in very large numbers, so that apparently many were formerly members of globi or conglomerate bacillary masses.

It is easy to understand that the cell wall of an effete macrophage (which is held to contain the globi) will be no barrier to the action of sulphone on the bacillus : the dissolution of smaller bacillary masses " seems to point to an interference with the natural tendency to clump ".

Secondly, there was an apparent increase in intracellular bacilli : it is suggested that sulphone may modify the organism and render it more susceptible to macrophage ingestion, and that the macrophages nevertheless are not destroyed. The author refers to similar morphological changes in *Myco. tuberculosis* after the exhibition of PAS, reported by Nagley and Logg [*Bulletin of Hygiene*, 1950, v. 25, 29] : in this case the " battered bacilli " were not viable on culture.

The author suggests that it may be shown by further research that " a certain change in morphology corresponds to a certain degree of morbidity and the microscopic diagnosis of a dead M. leprae can become possible ".

H. J. O'D. Burke-Gaffney

Bolgert, M., Montel, L. R. & Mollinedo, R. Lèpre et acide paraminosalicylique. [**Leprosy and Para-aminosalicylic Acid**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 9/10, 521–2.

In a previous short note [this *Bulletin*, 1951, v. 48, 45] these authors promised further observations on the use of PAS in the treatment of leprosy.

They now record that the favourable action of PAS is not prolonged, after the initial improvement, though it may be maintained for a time. They refer briefly to two cases in which it was necessary to change over to DDS. In other

cases, already under treatment with DDS for some time, PAS was not well supported and was apparently of no benefit.

The authors conclude that PAS plays only a very minor rôle in the treatment of leprosy. *H. J. O'D. Burke-Gaffney*

HANKS, J. H., with the assistance of Tobey BACKERMAN & Rachel BARRETT. **Measurement of the Hydrogen Transfer Capacity of Mycobacteria.** *J. Bacteriology.* 1951, Nov., v. 62, No. 5, 521–8, 2 figs.

"A metabolic method (based on the reduction of tetrazolium violet) for measuring the hydrogen transfer capacity of murine leprosy bacilli and other biological donor systems has been described. The procedures developed for the study of the hydrogen transfer capacity of mycobacteria have been summarized. The results obtainable have been illustrated by comparing the behavior of *Mycobacterium lepraemurium* and *Mycobacterium phlei* suspensions in the absence of added substrate."

HANKS, J. H., with the assistance of Tobey BACKERMAN & Rachel BARRETT. **The Biological Significance of the Hydrogen Transfer Capacity of Murine Leprosy Bacilli.** *J. Bacteriology.* 1951, Nov., v. 62, No. 5, 529–37, 5 figs. [10 refs.]

"Washed suspensions of *Mycobacterium lepraemurium* and *Mycobacterium phlei* have been compared under circumstances in which the two organisms behave similarly. Insofar as one may judge from the demonstrated relations between the plate counts and the hydrogen transfer capacity of *M. phlei* suspensions, it may be concluded tentatively with respect to *M. lepraemurium* that (1) the hydrogen transfer capacity of washed suspensions provides an estimate of the number of living cells, (2) this relation is also valid in damaged suspensions provided the bacteria are rewashed prior to testing, and (3) the hydrogen transfer capacity of incubated suspensions is an indication of the *relative* (not the *actual*) levels of viability which exist among aliquots of a given suspension."

ROGERS, Leonard & MUIR, Ernest. **Leprosy.** Addendum to Third Edition.
This book is reviewed on p. 339.

HELMINTHIASIS

MAINZER, F. Ein Beitrag zur Geschichte der Lungenbilharziase : Eine Arbeit Dr. Belleli's aus dem Jahre 1885. [**An Account of Belleli's Work on Pulmonary Schistosomiasis in 1885**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, Oct., v. 3, No. 2, 234–43, 1 fig. [Numerous refs.]

In 1885, a young Italian doctor, Vittorio BELLELI, published in the "*Unione Medica Egiziana*", of which he was the editor, an account of his findings at an autopsy on an Egyptian male known to have suffered from a *Schistosoma haematobium* infection. Belleli's work included a detailed description of the lesions observed in the lungs, and since the author of the present paper considers this to be the first published description of the pathology of pulmonary schistosomiasis and as access to the original paper is difficult, he has translated the relevant portions of Belleli's paper and has discussed his findings in the light of more recent knowledge. Dr. Mainzer's paper contains a critical review

of the literature concerning the pathology of pulmonary schistosomiasis, and there is an extensive list of references, so that the paper should be consulted in the original by those interested. *R. M. Gordon*

JANSSEN, P. Note préliminaire sur l'emploi d'un dérivé du thioxanthone dans le traitement de la bilharziose intestinale. [**Preliminary Note on the Treatment of Intestinal Schistosomiasis with a Thioxanthone Derivative ("Nilodin")**] *Ann. Soc. Belge de Méd. Trop.* 1951, Aug. 31, v. 31, No. 4, 441–5.

During 1950 some 2,000 Africans in the Belgian Congo with *Schistosoma mansoni* infections were treated orally with thioxanthone ("Nilodin", "Tixantone"). The dosage used for adults was 7·2 gm., which was given in divided doses repeated twice daily for 6 days ; for the average adult weighing 55 kgm. this amounted to 130 mgm. per kgm. of body weight ; children were dosed proportionately to their weight. None of the patients manifested acute symptoms of schistosomiasis ; the intensity of their infections, as judged by the number of eggs found in the stools on simple microscopical examination, was as a rule low. An intravenous injection of 2 gm. of Bayer 205 and microscopical examination of the stools 24 hours later was found to give as satisfactory a result in revealing the presence of an infection as did rectal biopsy. The latter procedure often yielded dead eggs several months after apparently radical cure of a parasitic infection.

Of 175 patients treated in 1950 who were individually studied, 17 were found still to be actively infected 2 months after the treatment. Disallowing the possibility of reinfection this indicated a failure to cure 10 per cent. of those treated with thioxanthone.

Side-effects due to the drug were encountered in some patients ; they accorded with those reported elsewhere ; the toxic manifestations did not persist after completion of the treatment. Side-effects were so marked in 24 of 641 adult patients treated orally with thioxanthone that the dosage of the drug had to be reduced ; in the case of 4 adults the drug had to be stopped on account of them. For similar reasons the dosage was reduced in the case of 13 of 655 children below the age of 15 years, and the drug was discontinued in the case of 2 children. These 1,296 patients were treated in 1951 and the full results are not yet available. *A. R. D. Adams*

DESCHIENS, R. Le problème sanitaire des bilharzioses dans les territoires de l'Union Française. (Thérapeutique, prophylaxie.) [**Schistosomiasis as a Health Problem in the French Union. Treatment and Prevention**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 9/10, 667–88. [16 refs.]

Preliminary surveys of the epidemiology of schistosomiasis within the French Union have prepared the ground for the treatment of cases of the disease, and its prophylaxis. In this paper attention is devoted to the fundamental treatment of schistosomiasis, to the effects of chemotherapy and of chemoprophylaxis, and to the prophylactic measures which are practicable in the territories under consideration.

Treatment of cases of schistosomiasis can be resolved into (1) specific treatments of the parasitic infections, (2) symptomatic treatment of the minor accompaniments of the disease (such as anaemia), and (3) correction of its major complications (such as tumour formation) by surgery or other special procedures.

Recognized specific treatment for destruction of the parasites includes the use of trivalent or pentavalent salts of antimony, and salts of emetine ; they

are given intravenously, intramuscularly or subcutaneously. The advantages and disadvantages of sodium and of potassium antimony tartrate, and the methods and details of their employment, are reviewed in the light of the literature ; the immediate clinical results of tartar emetic treatment are considered to be good. Fouadin (Neo-antimosan) and anthiomaline are similarly reviewed, as also are the salts of emetine.

After a brief consideration of the symptomatic, and of the surgical and special treatments, necessary in cases of schistosomiasis, attention is directed to more recent methods of chemotherapy and of chemoprophylaxis in these diseases. The need for treatment with a drug which can be given orally, as opposed to those mentioned above which must be injected either in hospital or during attendance at a clinic, is particularly evident in chemoprophylaxis. The literature on the thioxanthone (Miracil) derivatives is surveyed, and some experiences are recorded of the treatment of vesical schistosomiasis with Miracil D in Senegal with the dosage and methods of administration considered most suitable. The results were encouraging, and the citrate and the mandelate salts of Miracil D were found to be better tolerated than was the hydrochloride. Tin salts, and in particular stannous oxide, given by the mouth in a dose of 2 to 4 gm. daily (33 to 66 mgm. /kgm. daily) for 8 days, with repetition of this course on 2 or 3 occasions, seems to be effective in *Schistosoma haematobium* infections ; sufficient data have not yet been amassed to make a definite pronouncement on the matter.

Prophylaxis against schistosomiasis must be based on a knowledge of the developmental cycle of the worm and on the effects of specific treatment. Its aim should be to destroy adult worms in the human host, to prevent eggs passed by the human host reaching an intermediate host, to destroy the intermediate host, and to prevent contact of healthy subjects with infective water. The various means of achievement of these ends are considered ; it is emphasized that education of the population plays an important part in prophylaxis.

[This paper gives a good survey of present knowledge of its subject. It should be consulted in the original by those interested.] *A. R. D. Adams*

Pesigan, T. P. & Masiluñgan, V. A. **Studies on Schistosomiasis : Experiments on the Chemical Control of** *Oncomelania quadrasi* **Snails.** *J. Philippine Med. Ass.* 1950, Jan., v. 26, No. 1, 17–30, 6 figs. on 3 pls.

Having successfully established colonies of *Oncomelania quadrasi* in aquaria in Manila, the authors tested the effects of various chemicals on them.

Poor results were obtained with calcium chloride, potassium chloride, sodium chloride, DDT, gammexane and arsenic trioxide, but two chemicals, used by McMullen and Graham in Leyte in 1945 [this *Bulletin*, 1947, v. 44, 917], were encouraging in laboratory trials which led up to the field trials reported on herein. The two chemicals were (1) dinitro-ortho-cyclohexylphenol and (2) dicyclohexylamine salt of dinitro-o-cyclohexylphenol, and are referred to in brief respectively as the dinitro compound and the amine salt.

Toxicity tests with animals showed that mice were more resistant to both chemicals than were guineapigs and that the dinitro compound was slightly more toxic than the amine salt. Persons handling the chemicals suffered only minor irritation of the skin or mucosae.

The field trials were carried out at an endemic area in Mindoro and later at one in Leyte, and were directed against (*a*) snails on moist soil and (*b*) snails in water.

For the experiments on moist soil, plots 1 metre square, each containing a known number of snails, were treated with a measured amount of the chemical. Snail mortality was calculated after exposure periods of 15, 18, 24, 48, 72 and

96 hours. With the dinitro compound the dosage used was 10 gm./sq. m. and the salt was diluted with 2 parts of rice bran : 67 plots, bearing a total of 6,717 snails, were treated. The minimum snail mortality was 96·22 per cent. and resulted from 15 hours' exposure, while the maximum, about 99 per cent., occurred after 48 to 96 hours. With the amine salt, with the use of undiluted dosages of 18 gm./sq.m. and 22 gm./sq.m., the minimum mortality (after 15 hours) was lower, 70 per cent. and 60 per cent. respectively, while the maximum again occurred during the 48- to 96-hour periods and varied from about 95 per cent. to about 99 per cent.

In the experiments on snails in flowing water, various methods and dosages were tried, but owing to the low solubility and slow dispersibility of the salts, the snails were not killed and these trials were accounted a failure. Accordingly a portion of the stream was dammed to stop the flow for 8 to 10 hours and the water was dosed with chemical to produce a concentration of 10 parts per million. This proved successful but expensive, so water plots or compartments were constructed along the sides of the stream, where the snails are mostly found. The water plots containing a known number of snails were 1 metre square and 0·2 to 0·3 metre deep and were treated with chemicals to produce a concentration of 10 parts per million. Periods of exposure were 10, 15, 18 and 24 hours. Altogether, 32 plots treated with the dinitro compound gave mortality rates of 96·91 per cent. (for 10 hours) to 99·83 per cent. (for 24 hours) ; 24 plots treated with the amine salt gave mortality rates of 88·17 per cent. (for 10 hours) to 100 per cent. (for 24 hours).

In commenting on these results, the authors give a very fair evaluation of the advantages and disadvantages of the two chemicals tested. Although toxic to fish, which are killed in 24 hours by as low a concentration as 1 part per million, they are harmless to plants, especially rice crops, which in fact were improved by them, possibly by their action as a fertilizer. The poor solubility and low dispersibility of the chemicals might be an advantage where treatment of soil is concerned, for their action would be more prolonged. The disadvantage of these qualities was exemplified in the failure to be effective in running water. It is further pointed out by the authors that good results were only obtained in the field experiments after preliminary clearance of vegetation from the swamps or banks of streams had been carried out, and that this might be a serious disadvantage in large-scale snail-control projects. *J. J. C. Buckley*

MANSOUR, T. E. **A Study of the Action of Antimonial Compounds on the Liver Fluke** (*Fasciola hepatica*) *in Vitro*. *Brit. J. Pharmacol. & Chemotherapy*. 1951, Dec., v. 6, No. 4, 588–92, 3 figs.

The author has tested the effect of tartar emetic, fouadin and neostibosan, which are clinically active, on *Fasciola hepatica* in suspensions of serum or serum-saline during a period of 90 minutes. Kymographic tracings were made of contractions at the start of the experiment and at the end after the addition of amphetamine sulphate, which has the property of stimulating rhythmical movement in the flukes. In saline alone at a concentration of 1 : 1,000 no interference with normal rhythmical movement of the flukes was observed with any of the drugs. In 50 per cent. serum-saline mixtures tartar emetic at the above concentration caused paralysis and there was no response to amphetamine. The effect due to the presence of serum was not brought about by complement and the factor was in the serum dialysate when distilled water but not when saline was used. *J. D. Fulton*

Fain, A. *Lymnaea* (*Radix*) *natalensis undussumae* von Martens transmetteur naturel de *Fasciola gigantica* Cobbold au Congo Belge. Reproduction expérimentale du cycle évolutif de cette douve. [**Natural Transmission of** *Fasciola gigantica* **in the Belgian Congo by** *Lymnae natalensis undussumae*. **Experimental Reproduction of the Cycle**] *Ann. Soc. Belge de Méd. Trop.* 1951, Oct. 31, v. 31, No. 5, 531–9.

Arteaga Camero, C. Uso del Aralen en el tratamiento de la Teniasis. [**Aralen in the Treatment of Taeniasis**] *Rev. Facul. de Med.* Bogotá. 1951, Aug., v. 20, No. 2, 74–9.

The author, in Colombia, treated 7 cases of *Taenia saginata* infection with Aralen [chloroquine diphosphate]. All were adults between 20 and 50 and hence were given the adult dose of 1 tablet (0·25 gm.) per 10 kgm. bodyweight (total dose, 8 tablets or 2·0 gm.). The drug was given to the fasting patients in the morning, followed 3 to 4 hours later by a dose of castor oil. In all cases, the worms were expelled : in two cases, the expulsion of the scolex could not be confirmed. No toxic effects were observed, other than a transient nausea in three patients on the day of treatment.

Clinical details are given of all 7 patients. *H. J. O'D. Burke-Gaffney*

Corcos, A., Dupoux, R. & Abitbol, S. Traitement des parasitoses intestinales à vers ronds, par le diéthyl carbamyl-4-méthyl pipérazine (notézine). [**The Treatment of Intestinal Round-Worm Infections by Di-Ethyl-Carbamyl-4-Methyl Piperazine**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 3/4, 209–15.

The treatment of intestinal parasitic infections with Notézine (hetrazan) was undertaken. The course of treatment was always the same, namely 4 tablets [amount not stated] daily for 10 days for adults : children were given one-half to two tablets according to their ages. Most of the infections were multiple ; however, the effect of treatment on each worm infection was reported separately.

Ascariasis. Twenty-two cases were treated with 20 successes. In one of the failures 2 courses of treatment were given, but in the other *Ascaris* ova were still present and after 10 days' treatment a further treatment was refused.

Ancylostomiasis. Thirteen patients were treated : there were 7 successes, 5 failures and one death. The patient who died was very anaemic and only received 3 days of treatment. Of the failures 2 had 3 courses of treatment and 3 had only one course ; of the latter, 2 were children of 15 and 12 years respectively, and they only received 2 tablets daily for 10 days. [There is no indication that more than one post-treatment stool examination was made in the cases claimed as successfully treated.]

Trichocephalus (*Trichuris*) infection. There were 8 cases in 2 of which this was the only parasite. There were 2 failures and 6 " successful " treatments. The failures were recorded after a single course of treatment only.

Trichomonas infection was successfully treated in 6 cases.

In one case only were there any toxic symptoms and these were of a mild nature and did not necessitate interruption of the treatment. *L. E. Napier*

Goldberg, W. M. & Lymburner, R. **Strongyloidiasis with Gross Ascites.** *Canadian Med. Ass. J.* 1951, Aug., v. 65, No. 2, 152–3. [16 refs.]

A white male, aged 46, who had come from Rumania 19 years previously and had not left Canada since, was shown to have a strongyloid infection : rhabditoid larvae were found in the stools on 6 successive occasions. The chief

complaint was vomiting and loose watery stools, preceded by a period of constipation and abdominal pain and distension. He had also had a cough and dyspnoea.

He was found to have ascites and an enlarged liver : he had occasional bouts of temperature up to 101°F.

The blood counts showed slight anaemia (4 million red cells per cmm.) and a slight leucocytosis with no eosinophiles. There was an icteric index which varied between 16·6 and 33·3 units and a sedimentation rate which varied from 67 to 100 mm. in one hour. Other findings, including the liver function tests, were essentially normal.

Specific treatment consisted of 3 grains of gentian violet daily [period not stated] ; mercurials, liver, vitamins, and a high protein diet were also given, and paracentesis (4,500 ml. of straw-coloured fluid) was performed.

He was discharged as cured, but 3 weeks later he was readmitted with a recurrence of most of his symptoms and a return of *Strongyloides* larvae to the stools. An X-ray of the chest showed a picture suggesting atypical pneumonia.

The treatment was repeated and he was discharged 3½ weeks later, again as cured.

Six months later he was still free from symptoms and there were still no strongyloides in the stools.

[Not the least surprising aspect of this case is the ready response to gentian violet. It seems possible that the species of the worm encountered in the new world differs from that acquired in Siam. Gentian violet, even in much more heroic doses than were given in this case, usually fails completely to eradicate the infection from ex-prisoners-of-war, whereas American workers usually claim good results. Incidentally, 6 months is not a sufficient period of observation.] *L. E. Napier*

Bueding, E. & Yale, Helen W. **Production of α-Methylbutyric Acid by Bacteria-Free** *Ascaris lumbricoides*. *J. Biol. Chem.* 1951, Nov., v. 193, No. 1, 411–23, 5 figs. [31 refs.]

Boscardi, F. & Coltorti, M. Ricerca di sostanze ad azione mucinolitica in estratti di *Ascaris lumbricoides* e di *Fasciola hepatica*. [**Study of Mucinolytic Substance in Extracts of** *Ascaris lumbricoides* **and** *Fasciola hepatica*] *Riv. di Parassit.* Rome. 1951, Oct., v. 12, No. 4, 257–60.

The English summary appended to the paper is as follows :—

" The authors have sought in extracts of *Ascaris lumbricoides* and *Fasciola hepatica* the presence of ' mesomucinase ' by the viscosimetric method. These researches gave negative results."

Zylka, N. Die Röntgenuntersuchung bei Askaridiasis. [**X-Ray Examination in Ascariasis**] *Med. Klin.* 1951, Nov. 23, v. 46, No. 47, 1227–9, 2 figs.

This paper describes the X-ray shadows cast by ascarids either by deposition of barium on the surface of the worm or by ingestion of the contrast material, and discusses the diagnosis of these appearances from other shadows which may be seen. Some practical points in the examination of patients suspected of ascariasis by X-ray of stomach, bowel and biliary passages are stated. The indications and contra-indications of examination by X-ray of patients who may be suffering from ascariasis are discussed. *M. E. Delafield*

TAKEYAMA, O. **On the Egg-Production of the Human Ascarids expelled by various Anthelmintics [Report II].** *Osaka Daigaku Igaku Zassi [Med. J. Osaka Univ.* : Japanese Edit.] 1951, Aug., v. 3, No. 5, 375–85.

The English summary appended to the paper is as follows :—

" The number of the eggs which were produced outside of human body by human ascarids expelled by hexylchlororesorcinol and macnin has been calculated by a modified Stoll's dilution egg-counting method.

" 1. The egg-production of the worms expelled by hexylchlororesorcinol seemed to be considerably influenced and there was scarcely egg-production in more than half cases even at 30 to 38°C.

" 2. The egg-production of the worms expelled by macnin seemed to be less influenced and considerable numbers of produced eggs were recognized in a greater part of cases.

" 3. There was only little egg-production at the temperature lower than 20°C.

" 4. There was no definite relationship between dose of drugs, issuance day of the worms, their length or weight and the number of produced eggs.

" 5. From the epidemiological point of view, following note may be conduced, i.e., the contamination of the eggs produced by the worms which were expelled by those drugs should be by no means neglected in the summer of Japan."

NAGAI, A. **Influences of the Anthelmintics on the Egg-Laying Capacity of the Pig Ascarids *in Vitro* [Reports I–II].** *Osaka Daigaku Igaku Zassi [Med. J. Osaka Univ.* : Japanese Edit.] 1951, v. 3, No. 3, 231–46, 3 charts. [17 refs.]

The English summary appended to the paper is as follows :—

" First 42 female pig ascarids were reared in 1% saline solution at 38°C, then an observation was made on their length of the survival and the state of the laying of eggs. In the saline solution above mentioned, the average length of survival of these ascarids lasted 5·4 days (in 32 cases), and the average duration of their egg-laying was 3·9 days (in 30 cases).

" The number of eggs to be laid in the 1% saline solution was irregular immensely every day and also in each case, and it was found that the variation of the number of eggs to be laid was formed to various ' types ' respectively (the writer classified them into five ' types '), but the indications were shown that in most of cases eggs are laid and the total number of the eggs to be laid daily decreases.

" It was also found that on the second day of rearing, rather than on the first day, egg-laying cases increased and it was found frequently some cases showed the increase in the number of eggs to be laid in the middle of these observations. Such phenomenon is considered to be attributable to the reason that the ascarids adjust themselves to such rearing conditions and revive their egg-laying capacity to a certain extent after once they had been lowered.

" On the basis of the observation made above, a new experiment was conducted with regard to the length of survival and egg-laying conditions of the ascarids by keeping them in 1% saline solution at 38°C, after immersing in 1/6000 Hexylresorcinol 1% saline solution for the period of 5, 10, 15 and 30 minutes respectively.

" When the ascarids were reared in 1% saline solution after immersing in the solution of Hexylresorcinol above mentioned, for the period within 15 minutes, it was found that their average length of survival, average egg-laying duration and average number of eggs to be laid, show little difference compared with the basic observation which is presented at the outset of this report, but their capacity of egg-laying during the first 3 days goes down, and after

the immersion of 30 minutes their average life duration, and average egg-laying duration also are shortened and their egg-laying capacity is significantly [reduced] and their average number of eggs to be laid decreases. However, in each case of the immersion a tendency was shown that their egg-laying capacity is restored during 3–4 days following the commencement of their rearing.

" It is very interesting that the restoration shows the delay 1–2 days compared with the figure shown in the basic observation, and such delay seemed to reveal that the Hexylresorcinol has the ability of restraint to the egg-laying capacity of the ascarids temporarily."

NAGAI, A. **On the Influences of Anthelmintics upon the Number of Eggs of the Human Ascarids in Feces [Reports III–IV].** *Osaka Daigaku Igaku Zassi [Med. J. Osaka Univ.* : Japanese Edit.] 1950, v. 2, No. 5, 415–24. [14 refs.] ; 1951, Aug., v. 3, No. 5, 393–401.

The English summaries appended to the paper are as follows :—

Report III. " It is not difficult to assume that the administration of anthelmintics can influence upon the number of eggs of the human ascarids in feces, irrespective of the issuance of worms which can be caused by the administration of anthelmintics. However, no reports on this aspect have been made public so far. Fortunately I have succeeded in proving, as described in my Report II that by the administration of Santonin, the number of eggs in feces decreased temporarily, and when no worms were issued it has been found that the number of eggs was restored to its original number after two weeks.

" In this paper, I wish to report on the results of my observation which I have recently conducted on the influences of the administration of Alkylresorcinols on the number of eggs by means of Stoll's Dilution Egg-counting Method for the period before and after the administration.

" By the administration of Hexylresorcinol and Isoamylresorcinol, the egg-number of the human ascarids in feces was found to decrease, irrespective of the issuance of worms, and when the eggs in the feces do not show negative turn it was found that it decreases to the minimum number, as in the case of the administration of Santonin, mentioned in the previous report, in about 8 days after the administration of Hexylresorcinol and Isoamylresorcinol. It appears, however, that for the restoration of the number of eggs, a longer period seem to be needed, compared with the case of Santonin administration. Therefore I believe that the observation after two weeks following the administration of Alkylresorcinols, as appear in some of reports in the past, is complete.

" Consequently in order to conduct a rigid inspection on the number of eggs after the administration of these drugs, the egg-counting is better to be done after the repose of three weeks following their administration."

Report IV. " I have observed on the influences of macnin on the number of ascarid eggs in feces by means of Stoll's dilution egg-counting method for period before and after the administration.

" By the administration of macnin the number of eggs in feces decreased, irrespective of the issuance of worms, and when the eggs did not show negative turn, it reached a minimum number in about 9 days and then increased and restored to a constant number in about 9 days and then increased and restored to a constant number in about 2 weeks after administration.

" Therefore I believe that the influences of macnin upon the number of ascarid eggs in feces show the nearly same figure as in the santonin cases, and that the duration of such influences lasts shorter than that observed in alkylresorcinols cases.

" From the fact mentioned above, it may be concluded that by the egg-counting and examination made later than 2 weeks after the administration of macnin, the efficacy of this drug can exactly be decided."

FUSHIMI, J. **Studies on *in Vitro* Test of the Ascaricides [Reports II–V].** *Osaka Daigaku Igaku Zassi [Med. J. Osaka Univ.* : Japanese Edit.] 1950, v. 2, No. 5, 407–13, 3 charts ; 1951, v. 3, No. 2, 145–52, 2 charts ; No. 3, 223–9, 2 charts ; Aug., v. 3, No. 5, 387–92, 2 charts.

Report II. " It has been an accepted theory that the human and pig ascarids should be classified in the same category and as far as the morphological view is concerned, no difference was observable. I have recently made a research on a number of cases, under the imperative need, involving this matter in connection with their length and weight.

" Unexpectedly I have recognized that they are not identical in point of ratio in weight and length.

" Judging from the above proved fact and the values of the frequency of distribution, the human and pig ascarids presumed to differ in the velocity of growth.

" These facts are not necessarily very important with regard to the question of the classification of these ascarids but in case an experiment is to be done with the pig ascarids with a view to ascertain the behavior of in vitro test applying ascaricides, then it becomes significant.

" Namely in case of females whose length is below 30 cm, the human ascarids are heavier than the pig ascarids when their length is equal and the opposite fact is ascertainable in case the length exceeds 30 cm.

" Also in case of males, the human ascarids are heavier than the pig ascarids when their length is equal.

" These differences are of significance at the risk less than 1%."

Report III. " Following the experiment described in Report No. I, I made observations in the case of 1/6000 1% saline solution of Hexylresorcinol.

" As the results of this experiment, I have recognized that the lethal time of Ascaris lumbricoides from swine shows considerable differences due to worm-side factors—length, weight, color, corpulence and sex . . . as I have referred to in Report No. I.

" The lethal time of female worms falling between 15–19·9 cm in length of body is the longest ; the lethal times of worms either than this category are less.

" Compared to female worms there is not as great a difference of lethal time in the majority of which fall between 10–25 cm. in length of body. However, the lethal time of male worms 10–14·9 cm is the lethal time of those longer than this class grows shorter.

" The lethal time of male worms less than 10 cm in length is considerably short as the case of female worms.

" Male worms 15–19·9 cm in length and female worms 25–29·9 cm in length, most frequently distributed in these size, show an approximately equal lethal time.

" The same thing can be said concerning the weight of the worms which is in correspondence to the length of body.

" Worms of equal length show considerable difference of lethal time according the variation of color of body.

" For instance, the lethal time of worms light pink in color is considerably long.

" The lethal time of female worms ranging from orange to dirt-yellow in color becomes shorter and shorter.

" The lethal time of male worms dirty rose in color is the shortest.

" The lethal time also differs according to the corpulence of the worms. The corpulent worms and short duration : the less corpulent ones thrive.

" To sum up, the lethal time differs considerably according to these various factors. For instance, the lethal times of female worms distributed in the range from 40 minutes to 420 minutes. However the above mentioned facts are not absolute and cannot apply to each individual case at once."

Report IV. " As described in Report No. III in the case of 1 /6000 saline solution of Hexylresorcinol, the lethal times of pig ascarids differ considerably according to each worm-side factor. And in order to see whether the same can be said concerning the various degrees of concentration of Hexylresorcinol, I have experimented on two separate degrees of concentration—1 /4000 and 1 /8000, and have obtained the following conclusion.

" 1) The facts observed in the case of 1 /6000 concentration as described in Report No. III appear to every degrees of concentration, although the lethal times of groups of worms classified under worm-side factors differ in correspondence to the degree of concentration.

" 2) As a whole the lower the concentration the longer the lethal time ; the lower the concentration, the more considerable the difference due worm-side factors.

" 3) The correlationship between the logarithm of concentration and the lethal times of groups classified according to sex and length of bodies appear on the graph in approximately the same type of curves.

" 4) This relationship generally does not appear as straight line on the both logarithmic coordinates.

" 5) As I have referred to in Report No. II, Pig ascarids and human ascarids differ from each other in the relationship between age and length, and age and weight. Accordingly the above mentioned facts may not apply to human ascarids at once.

" I am conducting further experiments to determine the results in cases of other agents. In future in ' in vitro test ' of ascaricides various worm-side factors must never be overlooked."

DAVEY, J. T. & O'ROURKE, F. J. **Observations on *Chrysops silacea* and *C. dimidiata* at Benin, Southern Nigeria. Parts I, II & III.** *Ann. Trop. Med. & Parasit.* 1951, May & Sept., v. 45, Nos. 1 & 2, 30–37, 66–72 ; 101–9, 5 graphs & 2 figs. [31 refs.]

All three papers are concerned with observations on *Chrysops* spp. particularly *C. dimidiata* and *C. silacea*, in the vicinity of the Oil Palm Research Station at Benin, Southern Nigeria. The investigations were begun in 1945 owing to apparent increased fly populations and the occurrence of loiasis among station workers. (1) The station has an area of about 4,300 acres and is surrounded by rolling plains cut by a few deep valleys and ravines. Part of the station is on a fairly steep slope down to the Okhuo River, the remainder extending over the plains at an altitude of about 300 ft. above sea-level. Average annual rainfall is about 70 inches ; the permanent water-table lies about 100–200 feet below ground level. Swampy strips, a few yards wide, occur along the river courses. The station was made by clearing high forest, which still bounds the area to the north and east. Cultivation has been developed to the south. *Cercopithecus mona mona* is the most frequent monkey persisting from the original fauna.

European staff are housed about a mile from the Okhuo River, and the labour settlements are 2 and 3 miles from the river.

Only adults of *C. silacea* and *C. dimidiata* have been taken at Benin, the latter constituting 67 per cent. of 2,537 flies captured. Both species, and also *C. longicornis*, were bred out from the swampy areas of the Okhuo River. The flies were more numerous along this river, especially at sand pits, than in the station itself ; they were rare at ground level in adjacent forest ; they occur in the canopy of the trees along the river but are less abundant there than at ground level. No males have ever been taken in catches, although the sexes are approximately equal in numbers in bred-out material.

Chrysops is abundant during the rainy season (end of May to the beginning of November) reaching a peak in September (1·13 flies per boy-hour). The period of maximum density of adults is different for each species of fly. *C. silacea* reaches its peak in numbers in July or August when it is the dominant species. It has practically disappeared by October. *C. dimidiata* has been found to appear as early, and in as great numbers, as *C. silacea* but it does not attain a maximum density until October, when it forms 90 per cent. of the catches. There is some evidence from comparison of densities with monthly rainfalls to suggest that abundance of *C. silacea* is associated with decreasing rains (in August) and that the heavier rains between September and November are related to the greater abundance of *C. dimidiata.* Differences in the conditions best suited to emergence may explain these relationships, but this view is only postulated.

(2) *Chrysops*, at Benin, are taken biting between approximately sunrise and sunset. They bite up to midday or a little afterwards at the open sandpits on the river. In the early afternoon they retreat to the shade of the forest, but will attack men working nearby. The lower parts of the legs are the usual sites attacked both in man and cattle. Sheep are unattractive. Cattle bait are often successful for catching flies on dull days. The flies appear to be more readily attracted to a group of persons than to an individual. Experiments are proposed to investigate the attractant powers of various chemicals in a latex medium derived from *Carpodinus hirsuta.*

Marking experiments on the flight range of *Chrysops* were generally inconclusive, although one individual was found to have flown 1,200 yards. From collections in different parts of the station, it is shown that the greatest density of fly is on the Okhuo River, where the known breeding sites occur, and that there is a progressive decline in the size of the catches as one moves into the cleared and palm-planted area of the station. Within the plantations the flies are said to concentrate near the pathways leading from the river. At Benin, the flies have not been seen to follow pedestrians and vehicles and it is supposed that dispersal occurs at canopy level.

No ovarial development was seen in 300 dissected *Chrysops* despite the fact that most of them were caught near the known breeding places on the river.

(3) Tabanid larvae were collected by hand and by sieving from mud from the swampy strips along the Okhuo River, the only permanent water in the area. Of 653 larvae collected between 1946 and 1950 some were preserved for taxonomic study, many died, and emergences comprised 11 *C. silacea*, 7 *C. dimidiata*, 22 *C. longicornis*, and 28 other Tabanids. The specimens were kept in jars of damp mud and organic matter, changed weekly. Chopped earthworms and small insects were added at first but this was discontinued when it seemed that *Chrysops* larvae never fed on such things. The organic matter in the mud is thought to be sufficient. In another experiment no adults were obtained from 60 Tabanid larvae put into natural mud on the river bank and covered by a large cage.

Clear sandy sites on the river were not favourable breeding sites, larvae being common only in mud covered by decaying vegetable matter, and densely shaded by bush. The *p*H of the mud varied between 4·3 and 5·2 ; the carbon-nitrogen ratio was 17/1 ; the water was shallow, not exceeding about 1 in. in depth. The larvae were found chiefly in the damp, saturated mud at the edges of the stream and its pools. No larvae were found in mud covered by a foot of water, nor in dry soil above the shallow muddy margins of the water courses. The larvae in the favourable sites were within the top 3 inches of mud.

Despite substantial collections of Tabanid larvae from such places only 11 pupae have been taken. It is suggested that pupal sites may be different from those of the larvae.

A few notes are given on the duration of the larval and pupal stages. In the absence of knowledge about the oviposition sites and failure to establish laboratory strains of *Chrysops*, observations are based on the duration of larvae after collection. All exceeded 10 mm. in length and were, therefore, not probably recently emerged from eggs. Certain *Tabanus* spp. lasted as larvae for up to 124 days. The length of life for collected larvae of *C. dimidiata* was 7–43 days and for *C. silacea*, 2–32 days, in larvae collected early in the season. Few larvae were taken at the end of the season and none pupated. It is suggested that *Chrysops* larvae may rest between seasons in mud at depths below 12 inches and that samples have so far not included such deeply-sited specimens. The pupal period of *C. dimidiata* lasts for 6–10 days, and for 6–9 days in the case of *C. silacea*.

Measures of control are discussed. It appears unlikely that anti-adult spraying in houses would be successful since the flies are not closely associated with dwellings and premises at Benin. The restricted type of breeding site suggests that insecticidal treatment of breeding places should be attempted. There is need, in this connexion, to investigate the range-flight of the fly and to find out more about possible changes in breeding sites related to the seasonal phases of the larvae. Drainage of swampy strips along the river, and clearing of riverine bush, would probably justify the initial capital expense. Screening of houses against the adult fly is accepted as a useful measure, and, for outdoor protection, dimethyl-phthalate either undiluted or in 60 per cent. strength applied to the skin is effective for at least 2 or 3 hours.

This series of papers frequently compares and discusses the findings at Benin with observations on the same problem during recent years by Gordon and his colleagues at Kumba in the Cameroons and Sapele in Nigeria [see this *Bulletin*, 1950, v. 47, 1214]. *D. S. Bertram*

Dalmat, H. T. **Studies on the Flight Range of certain Simuliidae, with the Use of Aniline Dye Marker.** Reprinted from *Ann. Entom. Soc. of America.* 1950, Dec., v. 43, No. 4, 537–45, 1 map.

It is generally accepted that, in Guatemala and Mexico, human onchocerciasis is probably carried by *Simulium ochraceum, metallicum* and *callidum* : the evidence is epidemiological and even the presence of microfilariae in flies in the region where onchocerciasis occurs is not conclusive, for some at least of the parasites belong to species of worm which infect animals other than man.

In the author's experience, the adult flies are sometimes found in numbers in plantations in which they are not breeding. An example is quoted from near Solola, Guatemala, of an area in which the author failed to discover any breeding in December and January, though, in the next month, there was a serious plague of adult insects, many of the workers being severely bitten. It was

noted that the insects were biting indoors in an office. At this time, the author confirmed his inability to find breeding in this plantation and concluded that a large number of flies had moved in from some distance. He therefore felt that investigations on the range of flight should be undertaken.

The work was to be done in extremely difficult, mountainous country, so that it was necessary to make use of some simple technique and portable apparatus. It was found that if aniline dyes were ground up in wheat flour in a proportion of 1 part to 9 parts of flour, the powder adhered to the insects. If an insect was subsequently exposed to a solvent of 3 parts absolute alcohol, 2 parts glycerin and 1 part chloroform, it was possible to see the dye under a binocular microscope. The most convenient dye was Safranin Bluish. The technique of marking is described in some detail.

The author describes the site of the experiments, which was a mountainous area in Guatemala in which the 3 species of *Simulium* already mentioned occurred and in which human onchocerciasis was common. Flies were caught, as they visited a human bait, marked and released at a single, central point. In the 3 months from the end of February, over 19,000 marked flies were released, of which nearly half were *S. metallicum*. During the same period, over 700 collections were made at 20 catching stations, and over 18,000 flies captured. Only 21 stained flies were recovered; individuals of the three species of *Simulium* were included. They were recaptured at distances ranging between 2·1 and 7·4 miles, measured direct from the release point, but no collections were made at greater distances, and it cannot be said that the extreme range of dissemination was established. It is noted that one individual *S. metallicum* was recovered at a distance of 3·8 miles from the centre on the day after it had been released. [The very considerable capacity for flight which has been demonstrated is clearly important in relation to studies on the disease in Guatemala, but we think that the author is insufficiently informed about work in other continents when he says that "a review of the literature disclosed no records of previous flight range investigations with *Simulium*". The very small number recovered, only about one fly per thousand marked, raises the question as to whether the marking was durable in field conditions.]

P. A. Buxton

BHAJEKAR, M. V. **A Note on the Treatment of Guinea-Worm Infection.** *Indian Med. Gaz.* 1951, May, v. 86, No. 5, 193–6.

The author makes a preparation from the "*very tender adventitious roots of the banyan tree—Ficus bengalensis*" for the treatment of guinea-worm infection. He uses 3/4 ounce of minced fresh roots mixed with *gur* (crude sugar) for an adult and half the amount for children of 6–12 years. This is given freshly made each morning on an empty stomach. About three-quarters of an hour after the dose is taken there is usually a burning sensation in the stomach which is eased by 6 ounces of buttermilk. A light meal is allowed 3 hours later.

Locally only an aseptic dressing is applied.

The course may be repeated after 3 weeks.

On the fourth day there is almost invariably a rise of temperature associated with local pain and swelling and possibly an increase of discharge from the sinus where the guinea-worm is pointing; these symptoms subside within 3 to 5 days and then the sinus gradually heals.

In a number of cases the worms will be partly extruded during the course of treatment and can sometimes be drawn out, but if this is not done carefully the worm may break and the unextruded portion will be withdrawn deep into the sinus; a sharp reaction will follow but this subsides rapidly and complete healing follows.

In cases in which the worm is not pointing but can be felt under the skin, the worm usually can no longer be felt after a fortnight from the beginning of treatment, and in these cases there is no inflammatory reaction.

Records are given of 13 cases, but the author has treated 200 patients during the last 7 years, and of these about 85 per cent. were cured by one course of treatment; after a second course "about 6 cases improved and 25 showed no improvement". *L. E. Napier*

Basnuevo, J. G., Cowley Chávez, O. & Blanco Rabassa, E. Ocho casos de tricocefaliasis tratados por los enemas de Hexilresorcinol (Santokín). [**Eight Cases of Trichuriasis Treated with Enemas of Hexylresorcinol (Santokin)**] *Rev. Kuba Med. Trop. y Parasit.* 1951, May–June, v. 7, Nos. 5/6, 68–74, 3 figs. [19 refs.]

Basnuevo, J. G., Cowley Chávez, O., Sotolongo, F., Blanco Rabassa, E. & Achkar, R. Un nuevo tratamiento de la tricocefaliasis (20 casos curados). [**A New Treatment for Trichuriasis (20 Cases Cured)**] *Rev. Kuba Med. Trop. y Parasit.* 1951, May–June, v. 7, Nos. 5/6, 57–9, 2 figs. [14 refs.]

The patients were treated with Hexylresorcinol enemas.

Ricci, M. Sulla diffusione della ossiurosi nella popolazione infantile di un piccolo centro siciliano. [**Incidence of Enterobiasis in Children in a Small Sicilian Town**] *Riv. di Parassit.* Rome. 1951, Oct., v. 12, No. 4, 245–9.

The English summary appended to the paper is as follows :—

"The author has examined in the town of Montemaggiore Belsito (Palermo), using the Scotch Cellulose Tape method (Graham's method), a lot of 318 children, of which 171 were males and 147 females, running from above 1 year to 11 years of age. The first examination gave 77·14% positive tests, while the second 81·77%. Since the second examination had been conducted only on 42 children out of the 75 who were negative on the first examination, the actual infestation percentage should be calculated as 85·84% at least.

"No practical difference in the frequency of infestations according to sex has been noticed. Such frequency, however, is affected greatly by the children's age, being higher in older children."

Kozar, Z. Epidemiologia owsicy (Enterobiasis) ze specjalnym uwzględnieniem zamkniętych zakladów dziecięcych. [**The Epidemiology of Oxyuriasis (Enterobiasis) in Closed Communities of Children**] *Przeglad Epidemiol.* Warsaw. 1950, v. 4, Nos. 1/4, 50–97. [42 refs.] English summary.

The incidence of oxyuriasis in a Children's Home in Gdynia has been investigated. Of a total of 161 children examined by means of "cellophane" swabs 145 (90 per cent.) were found to be infected. Up to 6 examinations were made before a negative result was accepted. Eggs were found at the first examination in 100 instances (69 per cent.), at the second in 29 and at the third examination in 10 instances. These results are compared in a table with those published by American workers. Faecal specimens were also examined, and oxyuriasis was found in 13·3 per cent., infection with *Ascaris lumbricoides* in 28·4 per cent. and with *Trichuris trichiura* in 25·3 per cent. of cases. The usual distribution of age incidence in oxyuriasis was obscured by the fact that as many as 90 per cent. of the inmates were affected; there was no difference in sex incidence, although the infection appeared to be heavier in girls. Infection was widespread in those members of the staff, such as laundresses, cleaners, nurses and kitchen workers, who were in close contact with the children.

In an investigation of dirt from the children's nails eggs were found in 31·2 per cent. of instances ; the positive results obtained by this method were in general agreement with those of swab examinations, but positive results were twice obtained in instances where 4 swab examinations had been negative. The proportion of positive results was less than that found by other authors ; the method is thus not so reliable as the examination of swabs, and nail transference was evidently not of major importance in continuing the infection. Eggs of *A. lumbricoides* were found in nail dirt in 3·5 per cent. of instances. Eggs of *Enterobius* were found in 72 (73·4 per cent.) of 98 samples of dust from sheets used by the children ; the proportion of positive results was higher than that obtained by examination of a single swab, and examination of sheet dust is thus a more reliable method of diagnosis. Bed linen is thus an important source of infection which must be considered in planning preventive measures.

Examinations were made of 450 samples of dust from various parts of the buildings collected from places of three types : (1) in direct contact with the children (bed-rails, taps, handles), (2) in less direct contact (window ledges, floors, shelves), and (3) not touched by the children (lamps, curtain rails, picture frames). Eggs were found in 139 samples (30·8 per cent.) ; of 230 samples from the 3 types of situation collected in dormitories, eggs were found in 42·8, 38 and 18 per cent. ; of 41 samples from the girls' wash room in 66·6, 47·3 and 53·8 per cent. Positive results were obtained less frequently in samples from the dining room (11·1, 6·6, 20·0 per cent.), school room and corridors. Eggs of *A. lumbricoides* were found on door handles on 3 occasions. A case of probable reinfection by retroinvasion is described, and it is suggested that this occurs in many cases which are resistent to treatment. *D. J. Bauer*

Basnuevo, J. G. & Cowley Chávez, O. Los enemas de " Santokín Líquido " en el tratamiento de la Oxyuriasis. [**Enemas of " Liquid Santokín " in the Treatment of Enterobiasis**] *Rev. Kuba Med. Trop. y Parasit.* 1951, May–June, v. 7, Nos. 5/6, 74–5.

Wells, Helen S. **Studies of the Effect of Antibiotics on Infections with the Mouse Pinworm, *Aspiculuris tetraptera*. I. The Action of Terramycin Hydrochloride.** *J. Infect. Dis.* 1951, Sept.–Oct., v. 89, No. 2, 190–92.

" 1. A laboratory method for investigating the action of drugs against the mouse pinworm is presented.

" 2. Terramycin hydrochloride is effective in reducing the mouse infection with *Aspiculuris tetraptera* as manifested by a reduction in worm burden, reduction in size of retained worms, and diminished egg production.

" 3. Terramycin is especially effective against immature forms.

" 4. For the above effects it was necessary to continue treatment for 14 days."

Ricci, M. La trichinosi in Italia. [**Trichiniasis in Italy**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1951, June, v. 32, No. 6, 602–12. [13 refs.] English summary (4 lines).

The author reviews the incidence of *Trichinella spiralis* as recorded in Italy since 1865. Only sporadic cases in man or animals have been recorded before 1917, when an outbreak occurred in Bergamo [northern Italy] involving at least 6 persons, of whom 2 died. The infection was traced to a sow brought from Rovere di Velo (Verona) 4 months before it was slaughtered. In Sicily

there were outbreaks in 1933 (at least 6 cases with 5 deaths), in 1942 (20 cases with 2 deaths), in 1945 (84 cases with 13 deaths) and in 1946 (15 cases, all recovered). Rome had an outbreak in 1948 involving about 80 cases with no deaths.

The author refers to various surveys made in search of animal infestation with very few positive results, namely, 2 rats in 1934 and 1 dog in 1937 in Sicily. [See also this *Bulletin*, 1951, v. 48, 1033.]

Ricci believes that a certain number of cysts of *Trichinella* must be swallowed before any serious clinical symptoms arise in man. The latter becomes infested from affected pork and Ricci suggests that the remains of a tin of pork which had been imported from U.S.A. (where trichiniasis is still not uncommon) may have been given as food and have infected the animal which gave rise to the 1948 outbreak in Rome. In Sicily, one or more endemic foci or reservoirs may exist and may have been responsible for the cases. *J. Cauchi*

ALICATA, J. E. **Effects of Roentgen Radiation on** *Trichinella spiralis*. *J. Parasitology*. 1951, Oct., v. 37, No. 5, Sect. 1, 491–501, 1 text fig. & 14 figs. on pl. [12 refs.]

"1. Infective trichina larvae exposed to roentgen radiation at a dosage of 10,000 r failed to produce young when fed to susceptible hosts. This inability of the parasite to produce young insured the host against subsequent muscle infection.

"2. Following irradiations of 15,000 to 20,000 r, a few larvae were able to reach maturity in the intestine of the host. No larvae reached maturity following irradiations of 30,000 r. The latter larvae, however, underwent partial development in the host during the first 48 hours of experimental infection, after which all were eliminated from the intestinal tract.

"3. At irradiations from 100,000 to 600,000 r some live larvae were found in the intestinal tract of the host up to 24 hours after infection. However, no larvae were found in the intestinal tract 48 hours after infection.

"4. Irradiation of about 700,000 r completely destroyed the power of all trichina larvae to become established and develop in the intestine of the host. Such larvae were quickly eliminated with the feces of the host during the first 24 hours of experimental infection.

"5. With increased irradiation, a gradual reduction in the number of adult parasites found in the intestinal tract and in the musculature of the host was evident.

"6. The effects on trichinae were similar whether irradiated at 0°C. or at room temperature (24°C.).

"7. Trichinae were found to show no recovery from the effects of radiation when maintained under refrigeration for one month following irradiation and subsequently fed to susceptible hosts.

"8. Some of the evident morphological changes in irradiated trichinae were: shrinkage and degeneration of the ovary, inability of egg cells to undergo complete cleavage or to produce worm-shaped embryos, production of cuticular thickenings in the body wall, and stunted growth.

"9. The laboratory tests indicate that roentgen radiation in sufficient quantity is an effective and dependable method for the destruction of trichinae in meat.

"10. The practical application of roentgen radiation under commercial condition at the present time is questionable since an extremely high amount of radiation is necessary to destroy trichina larvae, and furthermore, it is not readily possible to irradiate large amounts of meat."

Taylor, D. R., Moore, A. M. & Schwarz, H. **Scalenus Anticus Syndrome caused by Trichinosis.** *J. Amer. Med. Ass.* 1951, Nov. 10, v. 147, No.11, 1044–6, 5 figs.

"A case of scalenus anticus syndrome caused by trichinosis is presented. "The protean nature of trichinosis and the desirability of considering it in the differential diagnosis of neuromuscular disturbances is reemphasized."

DEFICIENCY DISEASES

World Health Organization. Technical Report Ser. No. 44. **Joint FAO/WHO Expert Committee on Nutrition. Report on the Second Session.** Rome, 10–17 April 1951. 64 pp. Geneva : 1951, Nov. [3*s.* ; $0.40 ; Sw. fr. 1.60.]

World Health Organization. Technical Report Ser. No. 45. **Prevention and Treatment of Severe Malnutrition in Times of Disaster.** Report approved by the Joint FAO/WHO Expert Committee on Nutrition and presented to the Fourth World Health Assembly. 56 pp. [64 refs.] Geneva : 1951, Nov. [2*s.* 9*d.* ; $0.35 ; Sw. fr. 1.40.]

Louis, L. A. Dosage des protéines dans le sérum sanguin. [**Determination of Proteins in Blood Serum**] *Ann. Soc. Belge de Méd. Trop.* 1951, Aug. 31, v. 31, No. 4, 457–70, 2 graphs. [12 refs.]

The refractometric method and the biuret reaction method for the determination of the total protein in blood serum are described and compared. Both methods give satisfactory results, but the former is preferred for its rapidity and simplicity when a good refractometer and thermostat are available.

The results of a number of determinations by the biuret reaction indicate that the mean value for total protein in the blood serum of Europeans is 7·7 gm. per 100 ml. Values below 6·5 or above 8·9 gm. have a 95 per cent. chance of being pathological, and values outside the range 6·0–9·2 gm. are to be regarded as certainly pathological. The protein value is not influenced by sex or the duration of the stay in Africa. In the case of Africans from the Congo region who have adopted a mode of life near to that of Europeans, the serum protein shows higher values. The mean of 9·45 gm. per 100 ml. is recorded for 8 subjects.

J. H. Birkinshaw

Louis, L. A. Le test au thymol. [**The Thymol Test**] *Ann. Soc. Belge de Méd. Trop.* 1951, Aug. 31, v. 31, No. 4, 471–86, 2 graphs. [10 refs.]

The thymol test of Maclagan, when positive, affords evidence of liver disease ; a negative result does not with certainty exclude it. The author discusses the technique of the reaction and describes the preparation of the reagent. The various standards employed do not always give concordant figures.

When the test was applied to Europeans it was found that the values obtained increased with the duration of the stay in Central Africa up to about 15 years ; for longer periods the values were about normal. It may be that persons showing high values are progressively removed owing to inadaptability to tropical conditions.

J. H. Birkinshaw

WELBOURN, H. F. **The Growth of Baganda Children in the Vicinity of Kampala** *East African Med. J.* 1951, Oct., v. 28, No. 10, 428–37, 4 figs.

This is a small study concerned chiefly with the age-weight relationship. It is based on observations at some child-welfare clinics and at three day-schools in Uganda. The author plots separate graphs for boys and girls of the average weights found associated with each month of age in the first year of life, and with each year of life for the ages 2 to 15.

He has discarded any weighings done while a child was suffering from an acute infection, and all records relating to children with any severe chronic infection, but the weights of 7 out of 9 children who showed some evidence of syphilitic infection have been included. He has been a little bothered by the old problem of ascertaining with certainty the age of the African schoolchild, and he thinks that the apparent approach of the Baganda in later school years to English height-averages may be ascribable to an underestimate of the ages of some of his subjects.

The numbers of the weighings from which the averages at the given ages have been calculated range from 28 to 7 for boys, and from 25 to 11 for girls, in the first 12 months of life ; and from 97 to 4 for boys, and from 74 to 8 for girls, for the ages 2 to 15. The numbers used for calculating the average heights have approximately similar ranges. With such small numbers it is not surprising that the graphs, at least those of the monthly average weights for the babies, are rather irregular.

It seems that during the first 6 months of life African babies weigh much about the same as English babies of comparable ages. But at about the sixth month the Baganda falter and they end the first year some 3 pounds lighter than the average one-year-old English baby boy or girl. The African toddlers and schoolchildren gain weight at much the same rates as their English counterparts but the gap that was established between the races during the second 6 months of life persists.

The author does not think that the retardation is necessarily associated with infection and he contrasts the weight-age graphs of two African babies who acquired malaria after being weaned at about 6 months of age. One of these babies went on the diet of rather unrelieved carbohydrate that African mothers are prone to use—in Uganda, apparently sweet potato or plantain, chance milk, and perhaps tea—and this baby suffered a prolonged failure to gain in weight. The other baby received an adequate diet including regular milk, and in this baby the halt was only temporary. The graph, however, shows that even this second baby had failed to catch up again with the English average at the sixteenth month of age.

The author is apparently satisfied that the usual cause of the establishment of the interval that henceforward persists between the parallel weight-age graphs of African and English children is an inadequate supplementation or replacement of the breast-milk at about the sixth month ; and he feels that there should be further study to see if African children can be enabled to close this gap after babyhood. He promises to report at a later date upon findings in regard to Luo and Acholi children.

[Though comparisons of different varieties of children in differing circumstances have a limited interpretation, we need these studies to keep our understanding of child-growth full and broad. Weight-increase is probably more completely related to sufficiency of food than are some of the other innumerable alterations with age that we may perhaps include in our cognition of growth. When the author comes to consider heights rather than weights, or to look into the timing of the development of various abilities, or of the erupting of teeth, or of changes in postural attitudes, or of the onset of puberty

in boys or in girls, it may be that he will find genetic or endocrinal or environmental factors like the play of stimuli or habit-formations in such spheres as diet or social organization also at work in differentiating child-growth.]

W. A. Young

BEAN, W. B., FRANKLIN, M. & DAUM, Kate. **A Note on Tryptophane and Pellagrous Glossitis.** *J. Lab. & Clin. Med.* 1951, Aug., v. 38, No. 2, 167–72, 1 coloured fig. on pl. [12 refs.]

Since pellagra has declined in Iowa in recent years, few pellagrins are available for clinical trials. The two patients whose cases are reported had typical pellagra glossitis but no other definite stigmata of the disease.

The first, a man of 57 years, had been on an inadequate diet for some time and had lost 28 pounds in weight in 6 months ; he had a smooth, fiery red tongue and cheilosis, moderate atrophy and weakness of his leg muscles with foot-drop, numbness and tingling of the feet, and swelling of the feet towards evening.

He was put on a low B-complex diet with only moderate niacin restriction and after 3 days he was given nine 100 mgm. doses of tryptophane at hourly intervals. The tongue had improved by the end of the same day and by the next day it had lost its fiery redness and assumed a magenta colour. [An excellent coloured illustration shows this change.] Five days later, he was given 10 doses of 100 mgm. of nicotinamide at intervals of one hour. He was then put on a regimen of brewers' yeast and a high protein diet. The neuromuscular signs improved and when seen two months later he was walking well and the tongue was normal.

After the administration of tryptophane there was a slight but distinct rise in the urinary excretion of N^1-methyl-nicotinamide, but there was a much more marked rise—which was sustained—after nicotinamide had been given. After the latter there was also a 4- to 5-fold increase in the excretion of thiamine.

The second case was that of an alcoholic male of 31 years of age. As well as the tongue condition he had cheilosis, hepatomegaly with ascites, a palpable spleen, and oedema of the scrotum and lower extremities.

He was given 9 doses of 100 mgm. of tryptophane at hourly intervals with the same dramatic improvement in the tongue condition. The daily N^1-methyl-nicotinamide excretion rose from 12·5 mgm. to 33·4 mgm., and thiamine from 40·3 μgm. to 50 μgm. He was placed on an ample diet and given mercurial diuretics for two weeks : this treatment was continued after his discharge. Five weeks later he was seen again, the liver was reduced in size, the spleen was not palpable and there was no ascites. *L. E. Napier*

SPRUE

WOLL, E. & OLESON, J. J. **The Effects of a Folic Acid Antagonist (Aminopterin) on Albino Rats : a Study in the Pathogenesis of Sprue.** *Brit. J. Exper. Path.* 1951, Oct., v. 32, No. 5, 458–61, 10 figs. on 2 pls.

" Albino rats, fed a folic acid antagonist, were killed at frequent intervals, autopsied and the tissues examined microscopically. The findings were compared with those in control, food- and water-deprived animals.

" The chief alterations were : (*a*) a pancytopenia and maturation arrest of the red and white blood cells at the level of the stem cell, with macrocytosis ;

this progressed to total aplasia ; (*b*) atrophy of the gastro-intestinal tract, which had a specific pattern and did not involve the stomach.

" The changes were essentially similar to those seen in chicks made folic acid-deficient by diet or antagonist.

" The possible implications in relation to sprue are pointed out."

HAEMATOLOGY

BLITSTEIN, I. Hématologie normale des noirs du Congo Belge. Premier mémoire. Sang et moelle osseuse des adultes. [**The Normal Haematology of Africans of the Belgian Congo : First Memoir. Blood and Bone Marrow of Adults**] *Ann. Soc. Belge de Méd. Trop.* 1950, Dec. 31, v. 30, No. 6, 1401–421, 1 graph. [43 refs.]

In this investigation the peripheral blood and the bone marrow of 25 African males and 25 females were examined. The work was carried out at an elevation of 1,500 to 1,700 metres, but the subjects came from a lower level ; the majority were members of the Baluba tribe from Mwanza, but a second important group were Batabwa from Baudouinville. Their ages were from 18 to 35 years.

The blood was obtained by pricking the finger and the bone marrow by puncture of the iliac crest. The leucocyte counts were made by counting 500 cells and the myelogram by counting 1,000 cells.

The subjects were examined clinically and for parasites ; all were infected with hookworms and it was not possible to select persons free from this parasite or from *Plasmodium malariae*, but none was suffering from fever. Infection with intestinal schistosomes was excluded.

The results are shown in tabular form ; the range, the mean, the standard error, standard deviation and coefficient of variation are calculated for each sex and for the total.

The haemoglobin and red-cell counts of the two sexes showed the usual differences, but the differences in the other blood elements were not statistically significant.

The haemoglobin and red-cell counts were not significantly different from those of white persons ; the means were 106, 96 and 101 per cent., and the red-cell counts 5·172, 4·833 and 5·002 millions per cmm., in males, females and the combined groups. The reticulocyte percentage—namely 4·0 per cent.—was slightly higher than is usual in white persons ; this the author attributes to haemopoietic activity to overcome the slight blood loss from hookworms.

The leucocyte counts were slightly lower than in white persons, namely 6·385 thousands per cmm.

The main deficiency was in mature granulocytes. The mean eosinophile count was 9·629 per cent. The monocytes were also increased, 6·812 per cent. Turck cells were also frequently present in small numbers. These changes are attributed to bad hygienic conditions, the numerous infections which make a great demand on the mature leucocytes, the helminthic and malaria infections.

The increase in thrombocytes, 315·8 thousands per cmm. (within normal limits by most standards), is attributed to a defensive mechanism to counteract the small haemorrhages due to hookworms.

Each of these deviations from the normal is reflected in the myelograms. There is a relative increase in erythroblasts, and also in the myeloblasts and premyelocytes, the more mature cells of the granulocyte series. There is also an increase in the megakaryocytes.

The plasma cells are only very slightly increased, but the eosinophile elements and the monocytes are increased in the same proportion as in the peripheral blood.

The maturation curves of both the erythroblast and granulocyte series show acceleration for the same reason, the demand for the mature elements in the peripheral blood.

The haemoglobin was estimated by the Sahli-Gowers apparatus and the result given as a percentage [of what, not stated]. *L. E. Napier*

JOHNSTONE, R. M. **Some Observations on the Total and Differential Leucocyte Counts in Adult Male East African Natives.** *J. Roy. Army Med. Corps.* 1951, Oct., v. 97, No. 4, 251–67.

Between April 1949 and March 1951, the author studied the leucocyte counts of some 480 East African males in military Hospitals at Mackinnon Road and Nairobi. The subjects were members of military units or of the Civil Labour Force, aged 20 to 45. The counts were carried out by laboratory technicians who changed from time to time, so that there may have been random sources of subjective error. As a basis for comparison, 34 patients were classified as " apparently healthy ". They had been afebrile while in hospital, had 15 negative blood films in 72 hours, no detectable abnormalities in urine and stools and had normal radiographs of the heart and lungs. Later, 33 Europeans " screened " in the same way and apparently healthy, were also examined haematologically.

The total and differential leucocyte counts are given in complete detail in 12 tables. It was found that, in the 34 apparently healthy Africans, the total counts lay between 3,000 and 7,000 per cmm. and were thus lower than those accepted as being normal in Europeans in temperate climates. The difference was chiefly due to a relative smaller number of neutrophiles.

In 74 proved cases of *P. falciparum* malaria, the counts were not significantly changed, and this also applied in 39 cases of short-term fevers, except that in such cases a leucocytosis occurred in about 1 patient in 5.

In 38 patients with schistosomiasis, changes in the counts were not important, except when eosinophilia occurred or leucocytosis from secondary infection was present. It is noteworthy that eosinophilia was recorded in only 9 of these patients (and except in one case where it was 90 per cent. it varied between 10 and 18 per cent.). The author found eosinophilia in these cases " to be of small diagnostic or prognostic value ".

The majority of the patients were suffering from the common respiratory diseases, to which Africans are so susceptible. There was a tendency in all of these for a neutrophile leucocytosis, proportional to the severity of the infection. Thus, in 110 patients with bronchitis, 43 with bronchopneumonia and 58 with lobar pneumonia, there was a leucocytosis in 46, 27 and 40 respectively.

Furthermore, a " normal European distribution in the differential count " was absent in only 10 of these 211 cases. The author therefore came to regard " *any differential count with a normal European distribution as indicative of a respiratory infection* until it was proved otherwise, unless, of course, some other obvious cause such as tonsillitis or furunculosis was present. This rule was proved most useful in practice."

In 31 patients with tuberculosis, the total and differential counts were of no help in differentiating between tuberculous and pyogenic infection of the respiratory tract.

In miscellaneous pyogenic infections (20 patients) non-specific diarrhoea or bacillary dysentery (16) and infective hepatitis (17 patients) leucocytosis was common and the differential count showed a " European distribution " irrespective of the presence of leucocytosis.

The author stresses as practical points that among these East Africans (1) a count above 7,500 leucocytes per cmm. should be taken to indicate leucocytosis and one below 2,500 per cmm. as leucopenia and (2) a differential count showing the " normal European distribution " is relatively uncommon and " more often than not indicates the presence of disease ".

In the 33 apparently healthy Europeans, there were 8 in whom the normal neutrophile /lymphocyte ratio was reversed, so the author rejects the view that this phenomenon in healthy Africans could be attributed to racial or dietetic factors. He refers to the conclusion of ROBERTS in Nairobi [this *Bulletin*, 1949, v. 46, 491] that changes in the leucocyte series appear to be influenced by altitude and sun. The present author from findings in Mackinnon Road (1,100 feet) and Nairobi (5,500 feet) was unable to support this contention as regards altitude, but agrees that sunlight is the most likely cause of the diminution in the neutrophile count.

The author finds the total and differential leucocyte counts in East African adult males useful, firstly because in obscure fevers they help to differentiate between an undeclared infection (commonly respiratory) and " clinical " malaria ; and secondly because they help to exclude concurrent infections of this nature in patients with proved malaria who respond slowly to specific therapy.

[This careful study has been abstracted at some length, because it presents certain features of value which are not always evident in surveys of this nature. In the first place, the steps taken to screen " normal " Africans are given : much of the value of these haematological studies is proportionate to the extent to which the standards of " normality " are established. Secondly, the detailed counts are presented, so that the reader may appraise them for himself. The value of the counts would, perhaps, have been strengthened had polymorphonuclear counts of the Arneth or Cooke and Ponder type been undertaken also. The present reviewer in a study of East Africans over 20 years ago [this *Bulletin*, 1931, v. 28, 837] found such counts to be of value in association with differential counts. It is of interest that DEWHURST [*ibid.*, 1948, v. 45, 811] working with East African subjects comparable with those of Col. Johnstone, found a " left shift " in the Arneth count and suggested that this might be due, not to ultra-violet light, but to the thermal effect of a tropical climate.]

H. J. O'D. Burke-Gaffney

CHAUDHURI, R. N., CHAKRAVARTI, H. & DUTTA, B. N. **Blood Volume in Healthy Indians.** *Indian J. Med. Res.* 1951, Apr., v. 39, No. 2, 237–53, 6 graphs. [45 refs.]

" 1. The importance of blood-volume estimation is stressed.
" 2. The blue-dye method is described briefly.
" 3. Results of plasma- and blood-volume estimation together with total proteins and haemoglobin in 50 Indians are given. The mean values are :—

Plasma volume : 47·7 c.c. /kg. and 1,591 c.c. /sq. m. body-surface.
Blood volume : 83·1 c.c. /kg. and 2,770 c.c. /sq. m. body-surface."

WOODRUFF, A. W. **Anaemia of Pregnancy among Africans in Nigeria.** *Brit. Med. J.* 1951, Dec. 15, 1415–23, 5 figs. [65 refs.]

Twenty-five Nigerian women who were both anaemic and pregnant were investigated ; the majority had enlarged livers and spleens.

Malnutrition. Seven patients were weighed, and corrections for the months of pregnancy were applied ; there were 3 who in comparison with the normal

West African woman came in the lowest portion of normal weight scale and 4 who were distinctly underweight. The National Research Council (U.S.A.) recommends that pregnant women should have a daily intake of 85 gm. protein, of which one-half to three-quarters should be of animal origin ; 2,500 calories should be the daily minimum intake for them in the tropics. The food intake was assessed in 13 women. The majority had about 1 ounce of meat or fish only every three or four days, and none had more than 1 ounce a day ; in 7 of the 13 women, the caloric intake was below the 2,500 minimum. Another remarkable feature was a high incidence of twin pregnancies in the obstetrical history of these women. Thus there was a gross deficiency in the intake of animal protein and a more than usually severe drain on the little of it which was available. It is therefore not surprising that a liver biopsy performed on 24 women showed in almost all of them either fibrosis or fatty infiltration. Biochemical tests of liver function supported the histological evidence ; the thymol turbidity test, which was performed in 19 cases, was positive in 11 and within the upper limit of the normal range in 3 others. Identical results were obtained with the colloidal gold test. The hippuric acid excretion test was carried out in 5 cases and was positive in them all. The serum protein levels were within normal limits, but the albumin concentration was below the average of 4 gm. per cent. in 13 of the women, the globulin above the average of 2 gm. per cent. in all. The albumin/globulin ratio was below the normal range of 4·0/1–1·2/1 in 11 patients. In 23 cases histamine was injected and gastric juice was tested for free acid. Eight showed a histamine-fast achlorhydria.

Infections. There was no clinical evidence of syphilis and the Kahn test was positive in only one case out of 21 in which it was done. The anaemia in this woman underwent spontaneous remission after delivery and before anti-syphilitic treatment was given. There was no overt malaria. Stools were examined in 23 cases. Sixteen patients were found to be infected with *Ascaris lumbricoides*, 4 with *Trichuris trichiura* and 4 with *Ancylostoma duodenale*. These infestations were not considered to be of importance as causes of anaemia.

[Here the reviewer cannot quite agree with the author : there must be many women in West Africa who live on a low protein intake and become pregnant, and it is likely that there were additional causes in these 25 cases which tipped the scale and produced severe anaemia. Positive evidence of such possible factors should not be taken too lightly.

Ascaris can give rise to malnutrition and interferes with protein absorption. Four reasons are given for ignoring ankylostomiasis—" (1) That in only 4 cases out of 23 was the infection present." This does not exclude the possibility that the nutritional health in these four cases may have been decisively aggravated by the hookworms. " (2) Those infected were distributed in a random way among the macrocytic and normocytic groups, whereas the anaemia produced by ankylostome infections is typically microcytic." Hookworm anaemia is microcytic only if lack of iron is the prominent feature, if there is ample iron intake or iron is supplied by intravascular haemolysis—Schumm's test for methaemalbumin was positive in sixteen out of twenty-four cases—hookworm anaemia becomes macrocytic with a high reticulocyte percentage. " (3) Of four patients infected, two were given anthelmintic treatment immediately on admission, yet the anaemia did not materially improve." " (4) Of the other two cases, anaemia in one rapidly improved after delivery and in the other, some improvement with " marmite " was obtained before delivery." These arguments only preclude helminths as sole causes of the anaemia, whereas the question should be whether they tipped the scale when pregnancy was added to chronic protein starvation.]

Haematological Findings. The anaemia was severe with a mean Hb. of 5·7 gm. per 100 ml. [Plasma volume determinations are not included in this otherwise exhaustive study. It is likely that they would have shown the usual increased plasma volume of pregnancy with dilution of the circulating haemoglobin, a phenomenon which exaggerates the degree of anaemia when it is determined on gm. 100 ml. basis.] In two cases it was microcytic, in 15 normocytic and in 7 macrocytic. Reticulocyte percentages were 1·2 in the microcytic group, about 2 in the normocytic and 4·2 in the macrocytic group (range 3–7 per cent.). [To the reviewer this seems to suggest a correlation between reticulocytosis and increase in mean corpuscular cell volume in this series.] Hypochromia was seen in the 2 microcytic and in 4 of the normocytic bloods. Platelets were significantly reduced in all cases and white blood cells were 5,000 per cmm. or less in 11 cases. There was no abnormality of red-cell fragility (14 cases). Sickle-cell trait was seen in 3 out of 19 bloods, but had no aetiological connexion with the anaemia. The sternal marrow was examined in 23 cases—there was myeloid hyperplasia with a macro-normoblastic picture. In 2 cases megaloblasts were seen. There was little connexion between marrow findings and the peripheral blood picture.

Price Jones curves were constructed for 21 cases. In 13 was found a shift to the right and 7 cases showed a broad base in a centrally placed curve ; a shift to the left was seen only once in one of the two macrocytic bloods. The Price Jones curves therefore showed an enlargement in the mean cell diameter with a fall in average thickness, a finding which is of special interest in view of the work of LARSEN (*Acta. Med. Scand. Supplement* 220, 1948), who found the red cells in acute and chronic liver disease (hepatitis) to be broad and thin, a change which is nowadays to be thought due to abnormal spreading properties of cells when slides are made of blood from patients with liver disease.

A high protein diet, iron, marmite, folic acid and vitamin B_{12} had no striking therapeutic effect as long as the women were still pregnant. Parturition itself led to improvement of the anaemia and this improvement could be enhanced by the usual haematinics. Liver extract and "marmite" seemed to be superior to folic acid. [It is hoped that the author will continue these important studies and include in future work the estimation of plasma volume, so as to be able to assess how much of the spontaneous improvement of the anaemia on parturition was due to the fall in plasma volume with accompanying concentration of circulating haemoglobin, and how much was due to increased haemoglobin production. An aspect of this work which still needs elaboration is the follow-up of recovery. This will confront the investigator with great technical difficulties. Complete recovery from severe anaemia requires several months' hospitalization, but otherwise we cannot know whether termination of pregnancy and a high protein diet led to an improvement of anaemia only or to full recovery. Thus while the present investigation definitely establishes that pregnancy—particularly when there is an obstetric history of twin pregnancies—and protein deficiency contributed to anaemia, proof is still wanted that these two conditions were the sole causes. It is quite possible that infestations, or infections possibly causing the haemolysis with a positive Schumm's test found in most of the cases, or specific vitamin deficiencies, may be essential factors. It is, for instance, noteworthy that there seems to be an interaction between pregnancy and vitamin E deficiency in experimental animals, where symptoms of vitamin E deficiency with liver damage cannot be produced unless there is also drain on the maternal stores by pregnancy. As a matter of principle every investigation on causes of anaemia should bring as proof of aetiology data on complete recovery after the removal of the alleged causes.]

H. Lehmann

PALES, L. & LINHARD, J. Instructions pour l'étude de la sicklémie. [**Instructions for the Determination of Sicklaemia**] *Bull. Méd. de l'Afrique Occidentale Française.* 1950, v. 7, No. 1, 103–7.

The attention of directors of public health in A.O.F. is drawn to the importance of studies on sicklaemia in Africans. A review on this subject by Professor VALLOIS (Director of the *Musée de l'Homme*) from *L'Anthropologie* is quoted *in extenso*.

In order to facilitate these studies, notes on the technique for identifying sickle-cells are given, as follows :—

Put a ligature around the base of a finger and leave it for 2 or 3 minutes.

After cleaning the tip of the finger with sterile water, without the application of any antiseptic, and wiping carefully, prick the finger and collect a drop of blood on a slide.

Cover the drop of blood with a coverslip ; carefully avoid the introduction of bubbles of air.

Seal the coverslip with vaseline or paraffin.

Examine the slides for sickling at the end of 24 hours. The sickle-cells can often be seen earlier, in fact almost immediately in severe cases. Use no. 5 or 7 objective, with the usual eye piece.

The sickle-cells can be recognized from the following characteristics :

They are usually isolated ; they have tapered ends, and some are of the incurved sickle shape, justifying their name.

Their number is extremely variable and it is recommended that they are reported as a percentage of the total red cells.

In order that the information may be of value for anthropological studies it is necessary that in each case the race or racial group to which each belongs must be recorded precisely, and since there is much mixed marrying, it is advisable to give the racial group of the father and the mother. Reference should be made to the alphabetical index of populations, from the *Editions Mission Anthropologique de l'A.O.F.*

The sex, and topographical location from which each came must also be given.

In view of the importance of the possible correlation between sickling and blood groups, wherever possible the blood group of each person should also be ascertained. *L. E. Napier*

VAN DEN BERGHE, L. & JANSSEN, P. Maladie à Sickle Cells en Afrique noire. [**Sickle-Cell Disease in Africans**] *Ann. Soc. Belge de Méd. Trop.* 1950, Dec. 31, v. 30, No. 6, 1553–66. [36 refs.]

The authors describe the sickling phenomenon and give the techniques for testing for the sickle-cell trait. The rapid methods entail the use of either bacteria or chemicals for reducing the oxyhaemoglobin in the red cells, and the slow method depends on the normal metabolism of red cells in a sealed chamber utilizing the oxygen and thereby lowering the tension so that sickling will occur in a percentage of the cells.

The importance of research in this subject is emphasized, and in tabular form the authors give results obtained by personal experience. These results can be summarized as follows :—

Bantus of the Baluba tribe of Kasai	...	20·0 per cent. of 1,020 persons.
Pygmies—Efe Ituri (Epulu and Gombari)		25·9 per cent. of 456 persons.
Bantus of the Mamvu (Epulu) tribe	...	22·1 per cent. of 217 persons.
Bantus of Katanga (Elisabethville)	...	15·4 per cent. of 78 persons.
Bantu Bakumu and Barumbi (Angumu)		5·6 per cent. of 552 persons.

The authors conclude as follows :—

Many studies have been undertaken to ascertain the percentage of Africans with sicklaemia ; the percentage varies greatly according to the ethnological group considered. The technique for testing for sicklaemia is easily applied and should be included as a routine procedure in any medical examination in all African hospitals.

For the diagnosis of sickle-celled anaemia the only valid evidence is the presence of sickle cells *in vivo*.

We do not yet know the full importance of this affection in Africa any more than the pathogenic rôle of sicklaemia in general.

Only by the systematic correlation of our observations on sickle cells with other clinical and laboratory findings will our knowledge in this subject advance. [See also LAMBOTTE-LEGRAND and LAMBOTTE-LEGRAND, this *Bulletin*, 1951, v. 48, 918.] *L. E. Napier*

DREYFUSS, F., MUNDEL, G. & BENYESCH, M. **Sickle Cell Disease among Yemenite Jews.** *Harefuah.* Jerusalem. 1951, Nov. 1, v. 41, No. 9 [in Hebrew 168–71, 6 figs. (25 refs.) English summary 171].

This paper adds to the information contained in the authors' earlier note [this *Bulletin*, 1951, v. 48, 831]. They have now examined a total of 188 children up to March, 1951. Sickle cells were found in 20 : all came from the Yemen except 2 of Iraqui origin and 1 from Algiers. In one child of 5, the authors consider that sickle-cell anaemia was present.

The authors enlarge on their previous arguments regarding the probable significance of these findings. *H. J. O'D. Burke-Gaffney*

SILVERBERG, J. H. & SHOTTON, D. **Mediterranean Anemia (Hereditary Leptocytosis) in a Chinese Family.** *New England J. of Med.* 1951, Nov. 1, v. 245, No. 18, 688–90, 1 fig. [12 refs.]

" A family of Chinese exhibiting a mild, asymptomatic form of hereditary leptocytosis (Mediterranean anemia) is reported. The genetic implications are reviewed and the importance of recognizing this disease in non-Mediterranean groups is emphasized."

SMITH, C. H. & MORGENTHAU, Joan E. **Cholelithiasis in Severe Mediterranean (Cooley's) Anemia.** *Blood.* 1951, Nov., v. 6, No. 11, 1147–51, 1 fig.

VENOMS AND ANTIVENENES

MOUNTER, L. A. **The Specificity of Cobra-Venom Cholinesterase.** *Biochem. J.* 1951, Nov., v. 50, No. 1, 122–8, 5 figs. [27 refs.]

" 1. The hydrolysis of choline and non-choline esters by cobra venom has been studied : all hydrolysis is attributed to cholinesterase.

" 2. It is suggested that the enzyme is inactivated at interfaces giving an erroneous idea of the specificity pattern when sparingly soluble esters are used. The enzyme can, however, be protected by the addition of gum acacia or inert proteins.

" 3. The protected enzyme gives a specificity pattern similar to those found for other aceto-cholinesterases. Acetates are hydrolysed faster than the

corresponding propionates ; butyrates are not hydrolysed. The rate of hydrolysis of aliphatic esters increases as the acetylcholine configuration is approached, giving a maximum with 3 : 3-dimethyl-butyl acetate."

HURST, R. O. & BUTLER, G. C. **The Chromatographic Separation of Phosphatases in Snake Venoms.** *J. Biol. Chem.* 1951, Nov., v. 193, No. 1, 91–6, 1 fig.

" By adsorption on cellulose columns and fractional elution with sodium chloride solutions, a phosphodiesterase free of 5-nucleotidase has been prepared from the venoms of Russell's viper and a rattlesnake."

DERMATOLOGY AND FUNGUS DISEASES

KALISVAART, G. **Dermatitis caused by Night-Moths.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1951, June, v. 3, No. 2, 191–2.

Every wet season (December to April) in Macassar, Celebes, and its environs, many people develop an itching dermatitis on the extremities, thorax and head. It consists of erythematous patches and weals studded with papillae and papulo-vesicles. It is more frequent among the white than the indigenous inhabitants. Scabies was excluded and the author at first doubted the popular local suggestion that the dermatitis was caused by moths which swarm around lamps in great numbers : an exogenous dermatitis would not be expected to appear on covered parts of the body.

It appeared, however, that the wings of these moths, which are only seen in the wet monsoon, are covered with a greyish-white powdery substance which is easily shed. This material will initiate rapid erythema and itching if it is rubbed into the skin. Scratching increases the redness and urticaria. It is evident that this powder may fall between the clothes and the skin.

The condition may even be complicated by asthmatic manifestations and one such case is described in which the patient alternately acquired dermatitis with asthma in the wet season, lost them in the dry weather and developed them again when the rains and the moths returned.

The moths were identified as *Scirpophaga innotata*, the white rice borer, a very common insect. It does not seem to cause dermatitis in Java. [See also this *Bulletin*, 1951, v. 48, 496, 835.] *H. J. O'D. Burke-Gaffney*

CASTRO, A. & TREJOS, A. Constatación del primer caso centroamericano de Coccidioidomicosis. [**Record of the First Case of Coccidioidomycosis in Central America**] (Nota previa.) Reprinted from *Rev. Méd. Costa Rica.* 1951, v. 18, No. 204, 89–90.

The English summary appended to the paper is as follows :—

" The first case in Central America of Coccidioidomycosis is reported and the hypothesis is brought forth of the existence of a new endemic area in the Valley of Comayagua in Honduras."

RASSON, G. & THYS, A. Deuxième cas de chromoblastomycose observé au Congo Belge. [**Second Case of Chromoblastomycosis seen in the Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1951, Oct. 31, v. 31, No. 5, 547–50.

TROPICAL OPHTHALMOLOGY

Sie-Boen-Lian. **Serous Central Chorioretinitis in Djakarta.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1951, Sept., v. 3, No. 3, 235–44, 3 figs. [17 refs.]

A form of serous central chorioretinitis in Djakarta is described by the author. His observations are based on the examination of 50 patients.

The fundus showed an elevation of the macula lutea. In the middle of the swelling there was a small depression which contrasted as a red spot. The smallest veins were usually twisted in the swollen area. The foveolar reflex disappeared but returned after a period of time. Fine yellowish dots appeared after 1–2 weeks. At first they were small in number and localized in the centre. Later the number increased and they were scattered all over the swollen area. Later all swelling subsided, the small spots disappeared but the larger spots usually left scars with slight shifting of pigment.

Serous central chorioretinitis is frequent in Japan and Java but rare in Europe. In the aetiology the author considers that a spasm of the choroidal capillaries in the macular region as a result of certain stimuli in predisposed persons is the most probable explanation. The toxic products of a rice diet are considered in this respect. *E. O'G. Kirwan*

Ferrand, G. & Parlange, J. A. Un essai de " traitement de masse " des conjonctivites saisonnières aiguës en milieu rural marocain. [**Mass Treatment of Acute Seasonal Conjunctivitis in Rural Morocco**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 449–52.

Mass treatment of acute seasonal mucopurulent conjunctivitis was carried out by the authors in Morocco with instillations of 1 per cent. streptomycin twice daily. They treated 1,147 patients and found that five to six days' treatment with these drops was sufficient to cause a considerable reduction in the incidence of the disease.

Trachoma is not benefited immediately by streptomycin but by the cure of the accompanying conjunctivitis the evolution of trachoma is undoubtedly altered for the better. *E. O'G. Kirwan*

Mitsui, Y., Tanaka, C., Iwashige, Y. & Yamashita, K. **Terramycin in Ophthalmology.** *Antibiotics & Chemotherapy.* 1951, July, v. 1, No. 4, 253–8, 1 fig.

It has been reported previously by Mitsui and Tanaka [this *Bulletin*, 1952, v. 49, 187] that trachoma responds well to terramycin. Treatment with this antibiotic of other infections of the eye seen in Japan is now reported by the present authors. To them it appears to be the drug of choice in angular blepharo-conjunctivitis, blepharitis, pneumococcal conjunctivitis, acute purulent conjunctivitis, chronic dacryocystitis and hypopyon ulcer of the cornea.

In Koch-Weeks conjunctivitis terramycin is unsatisfactory and streptomycin is probably the better antibiotic.

In epidemic keratoconjunctivitis there is a low degree of effectiveness. The effect in tuberculous or allergic eye conditions, serous iritis of idiopathic nature and interocular interstitial keratitis is encouraging.

Crystalline terramycin hydrochloride was used in three forms, namely capsules (250 mgm.) for oral administration, ointment (0·1 per cent. or 0·5 per cent.) and terramycin-hyaluronidase-procaine mixture for subconjunctival injection (0·5 cc. of 0·5 terramycin, 0·5 cc. of 2 per cent. procaine solution with 100 V.R.U. hyaluronidase). *E. O'G. Kirwan*

Teraskeli, H. & Oravisto, T. **The Incidence of Trachoma in Finland in 1948.** *Rev. Internat. du Trachome.* 1950, v. 27, No. 4, 194–7.

The authors point out that statistics of trachoma in Finland were published in 1908 and again in 1924. In a similar investigation in 1948 enquiries were made by the Medical Administration and addressed to eye specialists, ophthalmic hospitals, general practitioners, prison authorities and medical branches of the armed forces : mass surveys were also made in schools, factories and poor law institutions in different parts of Finland.

Replies were obtained from 320 doctors in 211 areas. The number of cases of trachoma reported amounted to 791 (70 per cent. diagnosed by eye specialists). Women accounted for 65·8 per cent. of cases and their average age was 51·7 years compared with 48·3 years for men. The total number of cases recorded in 1908 was 5,273 and in 1924 it was 2,613. The incidence of trachoma in Finland as a whole in the year 1948 was estimated to be about 18,000, compared with 100,000 in 1908 and 70,000 in 1924.

The decrease is attributed to social improvements, including increased medical and specialist aid, to improved traffic conditions, social welfare work, public health nurses, general improvement in hygiene and propaganda. The authors consider that the general use of sulphonamides has been a very important factor contributing to the great decrease.

H. J. O'D. Burke-Gaffney

Mandic, L. & Stankovic, I. La lutte contre le trachome en Serbie. [**Trachoma in Serbia**] *Rev. Internat. du Trachome.* 1950, v. 27, No. 3, 148–9.

The English summary appended to the paper is as follows :—

" As the extent of trachoma in Serbia was insufficiently known (the number of reported cases having increased considerably since the last war), an inquiry was undertaken in the course of 1948, under the direction of Prof. Nesic of Belgrade, in the regions affected with the disease (Northern Serbia). The average percentage of persons affected was found to be fairly large, and varied from 6·47 per cent to 10 per cent, reaching as much as 33 per cent in some localities. Furthermore, the disease appears in two different clinical and therapeutic forms, each of which is characteristic of a different region. In order to diagnose early cases of the disease special attention was paid to lesions on the plica semilunaris. We employed retractors made by us and very convenient to use. Numerous cases of ' trachoma frustrum ', as well as those of the latent phase of the disease, were established. A lymphatic constitution does not seem to play an important part in trachoma infectivity. Combined therapy (expression, hydr. oxycyanide, sulfathiazole) was applied. For statistical analysis we used the chart drawn up by Markovic of Belgrade. The organization of facilities for treatment, so that patients would not have to seek medical aid outside of their place of residence, is described."

Pullar, A. J. **Some Aspects of Trachoma in Kenya.** *East African Med. J.* 1951, July, v. 28, No. 7, 283–7.

The author confines his observations to Asian patients, among whom trachoma in Kenya is a relatively mild disease, more of a nuisance than a serious disability. The usual history given is that there is burning and itching of both eyes, aggravated by exposure to sunlight, and epiphora and conjunctival injection. There is frequently a secondary muco-purulent conjunctivitis.

Trachoma among Africans is widespread and they have little natural immunity to the disease : in some parts of East Africa the incidence is nearly 100 per cent. The type of trachoma encountered is virulent and sequelae are the rule. Marked loss of sight and blindness are very common.

The author advocates the following courses of treatment :—

(*a*) 25 gm. of sulphatriad tablets taken orally with plenty of water ;

(*b*) Aureomycin ointment applied by the patient to the lower fornix four times daily ;

(*c*) If there is much secondary conjunctivitis, crystalline penicillin drops 10,000 units to each cc. are instilled four times daily. *E. O'G. Kirwan*

ETZINE. Le trachome et la cécité en Afrique du Sud. [**Trachoma and Blindness in South Africa**] *Rev. Internat. du Trachome.* 1950, v. 27, No. 1, 28–31.

Until 1944, when pensions were first paid to the indigent blind, there were few statistics of the incidence of blindness in South Africa. The subsequently recorded increase is disquieting and the registrations have risen in a few years from 4,000 to 28,639.

The incidence of blindness per thousand in the four principal ethnic groups in South Africa is given as 0·97 for Europeans, 2·30 for coloured, 0·57 for Asians and 3·67 for Africans. Trachoma was shown to be the cause of blindness in 1,170 cases out of 33,234, of which 746 were in Africans, 325 in coloured and 99 in Europeans.

The South African National Council for the Blind has carried out ophthalmic surveys on a large scale in native areas and the teams, working in co-operation with the local administrative and health authorities, prepare the ground by inspection and propaganda and make a special study of the economic and social conditions in the areas visited.

As the author points out, there are difficulties in producing completely accurate statistics, but he presents a useful table showing the results of surveys in 6 different regions in South Africa between 1947 and 1949, together with the eye lesions found. From this it can be seen that of 5,746 cases of eye lesions in these regions, trachoma accounted for 3,163.

An interesting comparison is made between the conditions, economic and social, in an area where the incidence of trachoma was high and in another where the disease was almost absent.

In the former (Potgietersrust) there were 310 probable and 1,936 actual cases of trachoma among 5,231 persons examined. Many blind mothers were seen carrying infants already attacked with trachoma, flies abounded and crawled over the faces of young and old, the people were dirty and had no ideas of personal hygiene. The schools were without water for washing, the land was overstocked and impoverished and soil erosion was advanced.

By contrast, Thaba Nchu, where only 4 cases of trachoma were seen in 1,086 people examined, is an area which has undergone governmental rehabilitation. The government dairy provides thousands of litres of milk to the schools at the equivalent of 50 French centimes a litre. The indigenous people possess their own market gardens and milk from their own cows. Projects for dealing with soil erosion have been introduced, personal hygiene is at a high level and there are many amenities, including water for washing.

[This note underlines the significance of trachoma in its social setting. The admirable enterprise of the South African Council for the Blind is worthy of imitation in many backward areas where trachoma is prevalent.]

H. J. O'D. Burke-Gaffney

SENÁ, J. A. El tracoma en las Republicas Argentina, Bolivia, Chile, Paraguay y Uruguay. [**Trachoma in the Argentine, Bolivia, Chile, Paraguay and Uruguay**] *Rev. Internat. du Trachome.* 1949, v. 26, No. 4, 281–300.

Argentine.—The author starts by references to previous reports on trachoma from 1871 ; the latest figures are already out of date, namely those for 1940. In that year, of 140,647 children examined 20,919 showed symptoms of trachoma (14·8 per cent.). On the whole the infection was mild ; of 19,556 active cases 8,388 (42·8 per cent.) were in the " incipient stages ". In the country there are centres and dispensaries for treatment, with competent ophthalmologists in charge.

Bolivia.—The rural districts are practically isolated from outside contacts and the numbers of trachomatous patients are small. One ophthalmologist reports that in 10 years of practice he has seen but few cases and all among those who had immigrated and had contracted the infection outside. Another, that among 14,216 patients examined (including those for errors of refraction) he had seen only 123 (0·86 per cent.) with trachoma. The majority of these, 103 of the 123, were Bolivians and 68 of them were from Sucra district and 16 each from La Paz and Cochabamba.

Chile.—The author divides this into 4 main zones, the North, the Central which he subdivides into a north and south central, the Southern and an Austral district. The North is subtropical, between the 17th and 32nd parallels, and during an 8-year period only 31 cases of trachoma were known among 579,165 population, 12 in Antofagasta, 10 in Atacama, 8 in Taracapá and one in Coquimbo. The north-central zone, between parallels 32 and 35–36, with a temperate climate and constituted by 7 Provinces ; among a population of 2,381,490 there were, between 1935 and 1942, 184 cases, 98 of them in Santiago, 79 in Valparaiso. The south-central zone, between 35–36 and 38–39 parallels, with a moist temperate climate, in the same period 1935–1942, 46 cases were seen among 1,104,484 inhabitants. The Southern zone lies between 38–39 and 44 parallels, cold with frequent rains. In this zone trachoma is rife. Among 892,583 persons inhabiting 5 Provinces there were 2,471 cases of trachoma ; 1,075, or nearly half, in Cantin Province. The Austral zone comprising Aysen with 17,064 inhabitants and Magallanes with 48,813, with a semi-arctic climate, registered no cases of trachoma.

Paraguay.—In the Ophthalmological Service of the Public Health Department, 57 cases were registered in 1942 and the ophthalmologist in charge saw 15 more in his private practice. Another privately practising ophthalmologist had 32 trachomatous among 1,200 patients. By the Ministry of Health Regulations trachoma is compulsorily notifiable ; no trachomatous person is allowed to enter the country ; treatment is carried out at a dispensary to which all such patients are sent ; school medical inspectors include an ophthalmologist and, lastly, all immigrants are examined by an ophthalmologist of the Health Department.

Uruguay.—It is said that the disease was almost unknown up to 60–70 years ago. Then, between 1905 and 1915 among 16,931 examined opthalmologically there were 1,100 trachoma patients. Between 1925 and 1936, among 34,337 patients seen at the Maciel Hospital there were 335 with trachoma (0·94 per cent.). There is a small hospital of 50 beds as an annexe to the National Institute for the Blind. In June 1943 the number treated at this Institute passed the 1,000 mark and it is thought that another 500 have received treatment at Montevideo hospitals and other institutions. It is probable that " the total number of trachoma patients in Uruguay does not exceed 1,500 and of these a good percentage may be regarded as cured or much improved ".

H. Harold Scott

CONTARDO, R. El tracoma en Chile. Contribution oficial de la Sociedad Chilena de Oftalmologia al Comité de Tracoma del ll Congreso Pan-Americano de Oftalmologia. [**Statistics on Trachoma in Chile in 1945 (Report to the Pan-American Congress in 1945)**] *Rev. Internat. du Trachome.* 1951, v. 28, No. 3, 348–52.

The English summary appended to the paper is as follows :—

"The average in the 4 principal districts is various from 0·90 p. 1,000 (Valdivia) to 5·78 p. 1,000 (Chiloé).

"Out of 5,023,539 inhabitants 2,732 are trachomatous, especially in the South."

VICTORIA, V. **Failing Sight caused by Trachoma.** *Rev. Internat. du Trachome.* 1950, v. 27, No. 1, 14–22.

The author compares the statistics from several countries relating to trachoma as a cause of blindness.

On the other hand few authors have studied the weakening of visual acuity by trachoma. Among 100 cases, 51 had normal vision, 22 had normal vision in one eye and in the other an acuity between 5/10 and 9/10 in 16 cases and under 5/10 in 6 cases.

Among those with failing sight in both eyes, 8 showed acuity below 5/10 in both eyes, 3 less than 5/10 in one eye and between 5/10 and 9/10 in the other and 16 an acuity between 5/10 and 9/10 in both eyes.

In another series of 500 cases, the author obtained the following figures :

Trachoma and age :

from	0 to 10 years	...	94 cases
,,	10 to 20 ,,	...	145 ,,
,,	20 to 30 ,,	...	112 ,,
,,	40 to 50 ,,	...	116 ,,
over	50 ,,	...	33 ,,

The visual acuity was :

less than	1/10	... 44 cases
between	1/10 and 5/10	59 ,,
,,	5/10 and 9/10	88 ,,

The remaining eyes had normal vision.

Most of the eye defects were due to leucoma and keratitis, pannus and xerosis. Other causes found included cataract, pterygion, myopia, strabismus, etc.

The author concludes that the acute forms of trachoma are the least harmful to sight and that the campaign against trachoma should be directed towards the earlier years of life. Results have improved in the last 10 years, because of better treatment, notably aureomycin. *H. J. O'D. Burke-Gaffney*

GURD, D. P. **Trachoma and National Service.** *Rev. Internat. du Trachome.* 1951, v. 28, No. 1, 11–18.

HALBRON, P. L'état actuel du problème microbiologique du trachome. [**Present Position Regarding the Microbiology of Trachoma**] *Rev. Internat. du Trachome.* 1951, v. 28, No. 2, 234–41. [16 refs.]

PAGÈS, R. Le rôle des conjonctivites aiguës saisonnières dans l'évolution du trachome. [**The Rôle of Acute Seasonal Conjunctivitis in the Development of Trachoma**] *Rev. Internat. du Trachome.* 1951, v. 28, No. 1 *bis*, 79–173, 1 fig., 3 pls. & 5 charts. [217 refs.]

POLEFF, L. Simple et rapide coloration de contraste des corps du trachome. [**Simple and Rapid Contrast Staining Method for Trachoma Bodies**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 9/10, 535–8, 2 figs.

This is an elaboration of the paper in which the method was described previously [this *Bulletin*, 1951, v. 48, 672]. *H. J. O'D. Burke-Gaffney*

MAC CALLAN, A. F. **The Signs and Treatment of Trachoma.** *Rev. Internat. du Trachome.* 1951, v. 28, No. 2, 175–95.

TABONE, V. L'auréomycine dans le trachome. [**Aureomycin in Trachoma**] *Rev. Internat. du Trachome.* 1950, v. 27, No. 3, 137–8.

The English summary appended to the paper is as follows :—

" The favourable results of aureomycin in some virus and virus-like infections, suggested that it might be of use in trachoma as well. The drug was used on a number of cases with a view of assessing its effect, on the disease, and the best method of employing it.

" The first series was treated by the local use of $\frac{1}{2}$ per cent solution of aureomycin hydrochloride, in the form of drops instilled every hour for several periods of five days each.

" The second series was treated with varying doses of aureomycin hydrochloride capsules, taken by mouth ; the optimum dose was found to be $\frac{1}{2}$ gm. three times a day for one or more periods of five days each.

" A third series was tested by the combined local and general methods, and these cases responded best.

" No untoward symptoms were observed with either method, even though the majority of patients were children. The solution of the hydrochloride did not irritate the eyes unduly in spite of its strong acid reaction. All cases treated as above improved, and a few were cured in a matter of days, but some cases proved resistant to the ordinary course.

" The view is expressed that aureomycin is perhaps the most effective drug against trachoma, so far, if given in adequate doses."

DESVIGNES, P. & MORAULT. Action de l'auréomycine sur le trachome. [**Action of Aureomycin on Trachoma**] *Rev. Internat. du Trachome.* 1951, v. 28, No. 3, 280–84.

The English summary appended to the paper is as follows :—

" The opinions on the action of Aureomycin on Trachoma are very diverse. It seems proved to be highly effective and fast on the inflammatory and functional signs. It is better on trachoma incipiens than on ancient stages. It is employed in thick and unstable borate acid drops at 2·5 p. 100, and in ointment at 3 p. 100. Aureomycin seems to be the best drug for trachoma's treatment."

BIETTI, G. B. & PASCA, G. Ricerche sull'attivita della streptomicina sui corpuscoli di H. e P. nel tracoma e nella congiuntivite cosiddetta da inclusi. [**On the Action of Streptomycin on the Inclusions of Halberstaedter and Prowazek in Trachoma and in Inclusion Conjunctivitis**] *Rev. Internat. du Trachome.* 1949, v. 26, No. 4, 260–64.

This is an instructive contribution for it deals not only with the subject of the title but also with a comparison between streptomycin and penicillin in the same conditions. Since the publication of GRIGNOLI's monograph on the uses of streptomycin in ophthalmology, this antibiotic has been shown to be of value in some of the symptoms of trachoma.

The present paper records the results of the antibiotic treatment of 13 patients with florid trachoma with epithelial inclusions, and one with typical inclusion conjunctivitis. In two of the trachoma patients the streptomycin was used as an ointment of strength 100,000 units per gm. and applied every 2 to 4 hours ; in the other 11, a watery collyrium of a strength of 10,000 units per cc. was applied every 2 to 6 hours. In 7 of the 13, one eye was treated with the streptomycin and the other with sodium penicillin as an ointment of strength 1,000 Oxford units per gm., applied every 3 to 6 hours. The results were tested by scrapings stained by Giemsa's solution and by comparing cultures of the secretion before and for 7 to 16 days after treatment. The results are detailed in a table but may be summarized as follows : in 9 of the 11 treated by the streptomycin collyrium no appreciable change in the H and P corpuscles was observed, either in number or morphology. In the other two the corpuscles were few and after the 3rd and 5th days of treatment could no longer be seen. In the eyes treated with penicillin, either *ab initio* or later when the streptomycin seemed to be inefficacious, the inclusions were not seen after 72 hours. In the two patients treated with the ointment in one eye and penicillin in the other, the penicillin-treated eye was free of the corpuscles on the 2nd and 3rd days respectively, the disappearance being preceded by regressive changes ; in the streptomycin eye the inclusions disappeared after 5 and 6 days of the treatment, though no retrogressive changes were observed.

It seemed clearly evident that penicillin was much the more active of the two antibiotics in these trachoma patients.

In the case of the patient with inclusion conjunctivitis, the inclusions disappeared by the 3rd day of streptomycin treatment and after 10 days the clinical condition was much improved and in a fortnight the patient left " in good condition if not altogether cured ". *H. Harold Scott*

FALCONE, G. Il cloramfenicolo in oftalmologia tropicale. [**Chloramphenicol in Tropical Ophthalmology**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1951, June, v. 32, No. 6, 582–93. [11 refs.] English summary (9 lines).

The author is ophthalmologist to the civil hospital at Mogadishu, Somaliland, and he briefly records his experience with the use of a [synthetic] chloramphenicol ointment for the treatment of diseases of the conjunctiva and of the cornea, and in eye surgery. He refers to 27 of his cases and gives a short clinical note on each. The ointment has proved useful in gonorrhoeal infection [1 case only] and when conjunctivitis was due to the Koch-Weeks or to the Morax-Axenfeld bacillus and in the treatment of corneal ulcers which were complicated by a hypopyon. In surgery of the eyeball, the ointment was usefully combined with the administration of vitamin H (para-aminobenzoic acid).

The ointment keeps well and is not affected by climate, which adds to its usefulness in the tropics. *J. Cauchi*

GUEVARA, R. **The Concise Pharmacology of some Drugs used in Ocular Therapeutics.** *J. Philippine Med. Ass.* 1951, Sept., v. 27, No. 9, 563–76. [22 refs.]

GAUD, J. & FAURE, P. Effet de la lutte antimouches sur l'incidence des maladies oculaires dans le Sud marocain. [**Effect of Fly Control on the Incidence of Eye Diseases in South Morocco**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 446–8.

The effect of the destruction of flies on the incidence of eye disease in South Morocco has been studied by the authors. Inflammatory diseases of the eye—

trachoma and the different varieties of acute conjunctivitis—only were observed. Fly destruction was carried out in selected villages by insecticides, and the incidence of eye disease in these and the untreated neighbouring villages was contrasted. The authors found that fly destruction leads to a considerable reduction of eye diseases in children, but the results in adults were inconclusive.

E. O'G. Kirwan

HEAT STROKE AND ALLIED CONDITIONS

LADELL, W. S. S. **Assessment of Group Acclimatization to Heat and Humidity.** *J. Physiology.* 1951, Nov. 28, v. 115, No. 3, 296–312, 2 figs. [31 refs.]

The author makes use of data obtained by himself and his colleagues of the Medical Research Council's team of workers on heat physiology during 1944 and 1945, together with further data obtained later on British service personnel stationed in Lagos.

From the data for 17 men who were among the subjects of the earlier experiments the course of acclimatization to a hot and humid climate over a period of 9 exposures is described. The main changes seen were in the pattern and rate of sweating. A regression equation relating overall sweat production to the number of exposures to heat is given, as is also another equation showing the ratio of sweat-loss to rise in rectal temperature in relation to the number of days of exposure to heat. In both instances the mean figures for the group of 17 men fit a logarithmic curve very well, but there is much scatter among the individual observations.

It is suggested that either of these regressions may form a basis of comparison for estimating the degree of acclimatization of a group of men, all equally acclimatized, after a single test on each person. The individual variation is so great, however, that one cannot by means of a single test on an individual subject estimate that subject's degree of acclimatization. Thus, the average " corrected sweat loss " in 80 minutes on the 6th and 7th days of exposure is in the neighbourhood of 1,100 gm., but individual sweat losses varied between 1,700 and less than 400 gm. *Thomas Bedford*

TROPICAL ULCER

MONTESTRUC, E., SAINT-CYR, C. & VERTUEUX, G. L'équilibre protéique du sérum sanguin chez les porteurs d'ulcères phagédéniques des pays chauds. [**Protein Equilibrium of the Blood Serum in Sufferers from Tropical Phagedaenic Ulcer**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 9/10, 531–3.

In 11 of 13 cases of phagedaenic ulcer examined, the serum protein equilibrium was abnormal. While the total protein was mostly within normal limits the globulins were always augmented and the albumins usually decreased. The duration of the disease appeared to have no influence on the results. A fall in serum albumin always accompanies dietary deficiency, which may play an important part in causation of phagedaenic ulcer. *J. H. Birkinshaw*

MISCELLANEOUS DISEASES

Sausse, A. Pathologie comparée des populations primitives noires et indiennes de la Guyane française. [**Pathology of the Primitive Black and Indian Populations of French Guiana Compared**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 455–60.

Most of the scanty population of French Guiana is concentrated along the coastal belt : there the indigenous population are of very mixed blood and are officially designated Creoles. Their pathology has been well studied and numerous reports have been published. It is otherwise with the small groups of people who dwell along the water-courses in the dense primitive forest which covers the great part of the country. The observations here recorded were made along the course of the Maroni, the largest, the most populated but the least known of the river systems of the country.

A brief graphic description is given of travel through the formidable forest. Away from the river bank nothing but forest is seen. The fauna is scanty and largely confined to the tree-tops-birds, butterflies and monkeys. Dangerous animals and venomous snakes are very rare. But the dangers of losing oneself are very real. Marching in the forest is a slow and painful business, slipping on steep slopes or passing through the black sticky mud of marsh ; hills and marsh alternate. Bites of flies, stings of ants, ulcers resulting from squelching through mud, abrasions from falls, add to the traveller's misery. Even if one is preceded by a good team of undergrowth clearers 3 to 4 kilometres a day is a good march. The river itself, though dangerous rapids are numerous, is the only practicable means of communication.

The middle part of the 500 kilometre long Maroni River basin is inhabited by the Boni, the only tribe of primitive black people in Guiana who pay allegiance to the French colonial government. Of mixed African origins they now form a homogeneous group of about 500, 400 of whom are in French territory.

Along the upper course of the river live some 120 Indians. When French Guiana was discovered it was said to have contained 25,000 Indians ; there are now less than 1,000. The small Indian population of the upper Maroni are Roucouyennes.

The Boni and the Indian territories touch and the two people are on friendly terms but their nosology presents striking differences. Some diseases are common to both, dyspepsia, dysenteries, conjunctivitis and intestinal helminth infestations. The Boni suffer from venereal diseases which were never seen among the Indians. Malaria is widespread in both regions ; *Anopheles darlingi* is very prevalent, but the reaction of the two peoples to the infection is markedly different. Most Boni children have enlarged spleens but adults rarely show signs or symptoms of active malaria infection. The Indians suffer from continual attacks of fever and often die from malaria cachexia. Eighty-nine per cent. of Indians examined had enlarged spleens and the average size of the enlarged spleen was three finger-breadths below the costal margin. Indian adults suffer from malaria much more than the children.

Yaws is very widespread, almost universal, among the Bonis ; not a single case was found among the Indians. The same was true of skin infections in general ; ulcers of all kinds, mycoses, suppurating wounds, etc., are very frequent among the Bonis, unknown among the Indians. Severe outbreaks of cerebrospinal meningitis have caused considerable mortality among Boni children ; no such outbreaks have been reported among the Indians. The Bonis display considerable resistance to pulmonary infections to which the Indians

are hypersensitive. No obvious case of tuberculosis was seen in either group : 41 cutaneous reactions among the Indians which were all negative indicate the absence of tuberculosis infection.

Seven Indians were found suffering from Oké-Oké, a hitherto undescribed disease. A febrile onset is accompanied by oedema of one foot. Loss of power in the foot is followed by retraction and muscular atrophy ; the victim is left permanently crippled.

Pathological heart conditions were equally prevalent among the two populations. *Norman White*

PICKUP, J. D. & RILEY, I. D. **A Case of Tropical Eosinophilia and Acute Nephritis.** *Arch. Dis. in Childhood.* 1951, Aug., v. 26, No. 128, 301–3. [30 refs.]

A girl of 6 years who had been born in India of British parents was admitted to hospital with bronchitis, generalized oedema, and albuminuria. She had had two previous admissions during the year with similar symptoms. A blood count showed a high eosinophilia, 10,150 per cmm. of a total leucocyte count of 20,300, and an X-ray of the chest " coarsening of the lung mesh ". The condition remained unchanged for 7 to 8 weeks when she was given 0·1 gm. of neoarsphenamine and the dose was repeated at weekly intervals for 6 weeks. The clinical condition improved steadily and in 3½ weeks the eosinophile count had fallen to 2,100 per cmm. of a total leucocyte count of 14,000, and in another 2 weeks to 288 per cmm. The albumin in the urine, which was only present as a trace before treatment began, disappeared completely, the blood sedimentation rate, which had been 46 mm. in one hour a week previously, fell to 1 mm. two days after the treatment was started.

The X-rays showed an improvement in the lung condition but a persistence of increased vascularity. Two years later the lung fields were clear.

There were at no time any parasites in the faeces.

A biopsy of a lymph gland and muscle showed no evidence of Hodgkin's disease or of periarteritis nodosa but an excess of eosinophiles in the tissues.

The diagnosis is discussed and it was considered that it was a case of tropical eosinophilia associated with an attack of acute nephritis ; whether the association was accidental or aetiological could not be decided.

L. E. Napier

DANARAJ, T. J. [M.D.] **Eosinophilic Lung. A Study of 150 Cases seen in Singapore.** 57 pp., 10 charts & 17 figs. 1951. Singapore : Papineau Studios, 304–U Orchard Road.

The monograph starts with an excellent review of the literature ; the author draws attention to the important paper of FRIMODT-MÖLLER and BARTON in 1940 [this *Bulletin*, 1941, v. 38, 539] and that of TREU in 1943 [*ibid.*, 1943, v. 40, 720], papers often overlooked by other authors, many of whom give to WEINGARTEN [*ibid.*, 407] the whole credit for the drawing of attention to this disease. [The author—or more probably the printer—has made a mistake in the text in referring to Weingarten (1942), whereas in the references it is correctly given as 1943.]

The clinical review of the disease commences with about a dozen case notes illustrating different aspects of the disease. The author gives very clear charts showing the effect of treatment on the eosinophilia and the erythrocyte sedimentation rate. The effect on the former is constant and usually dramatic, but on the latter it is sometimes disappointing, especially in patients with pulmonary tuberculosis or other infections.

The disease was first described in India and it is of great interest that in the mixed population of Singapore at a hospital where the proportion of Chinese to Indian patients is 3 to 1 nearly 80 per cent. of the 150 patients on which the author bases his report should be Indians. Eighty-five patients were between 20 and 40 years of age.

The commonest symptom was cough (98·6 per cent.), usually in paroxysms accompanied by breathlessness (73 per cent.) and expectoration (71 per cent.). The next two symptoms in order of frequency of occurrence were fatigue (73 per cent.) and loss of weight (63 per cent.). Sweating during the paroxysms, insomnia, anorexia, and pain in the chest each occurred in over 30 per cent. of cases. Fever was observed in only 21 per cent. and haemoptysis in only 9.

Other abnormal physical signs were few except those in the lung ; 75 per cent. had crepitations and rhonchi. Splenomegaly was observed in only 4 cases.

The total leucocyte count before treatment was never below 10,000 and in one case was over 100,000 per cmm. ; in 142 cases it was between 10,000 and 45,000 per cmm. and in 91 cases between 15,000 and 30,000 per cmm. After treatment it was below 10,000 per cmm. in all the cases (106) in which the count was done. The eosinophile count was never below 3,000 per cmm. before treatment and never above it after treatment. In 97 cases the count was between 10,000 and 30,000 per cmm. and in 13 cases above the latter figure, the highest being above 100,000 per cmm.

The erythrocyte sedimentation rate was increased in all but 6 cases, and in 14 cases it was above 50 mm. In uncomplicated cases the rate fell during treatment and was a good criterion of improvement.

" The X-ray picture of the chest showed enlarged hilar shadows, increased striations and mottling in both lung fields. The striations, mostly fine or of medium calibre extended almost to the periphery and occurred over both lung fields, but were most marked in the mid-zone and basal regions. The enlarged hilar shadows had an irregular border, and did not suggest glandular enlargement. Numerous discrete, soft round shadows with ill-defined margins, varying in size from a pin's head to about 3 mm. in diameter, were scattered throughout both lung fields, most prominent in the basal and mid-zone areas, lessening in degree from below upwards, and leaving the apices clear."

This was the characteristic picture, but in some cases the distribution of the shadows was slightly different ; in 81 per cent. of cases, however, the picture was characteristic enough to make a diagnosis of eosinophilic lung. The X-ray findings could not be correlated with the clinical symptoms or the eosinphile counts.

Examination of the sputa revealed mites, of several families, in over 40 per cent. of the cases, but in a control series mites were found almost as frequently. Examinations of the stools for ova of helminths were positive in 61 per cent. of cases : the eggs found were those of ascaris, hookworm, and whipworms, in that order of frequency. Microfilariae were never found in the blood films taken at night, repeatedly, in 61 cases. The Kahn test was negative in 119 cases, doubtful in 16 and positive in 8.

For treatment, the following organic arsenical compounds were used, either parenterally or orally :—

Novarsenobillon, 6 to 8 weekly injections each 0·3 to 0·45 gm.
Mapharside, 6 to 8 weekly injections, each 0·03 to 0·045 gm.
Neohalarsine, 6 to 8 weekly injections, each 0·03 to 0·045 gm.
Acetylarsan, 6 weekly injections, dose varying with age.
Stovarsol (4 grain tablets) twice or thrice daily for 7-10 days.

The response was dramatic : improvement occurred after the first or second parenteral injection and after the fourth injection the patient was usually symptom-free.

A total of 107 patients were treated by parenteral arsenicals with a cure rate of 86 per cent., 19 by Stovarsol by mouth with a cure rate of 74 per cent. (14 cases), 10 by bismuth with 2 cures, and 9 by penicillin with one cure. Among those treated by parenteral arsenicals 15 relapsed and 2 had toxic symptoms, whereas among those treated with stovarsol none relapsed but 5 (26 per cent.) had toxic symptoms : one of these developed a fatal encephalopathy. Relapses occurred after a period of 3 to 29 months ; only 5 showed relapses within 11 months.

The diagnosis could usually be made clinically, but was confirmed by the high eosinophilia and raised sedimentation rate. The X-ray picture gave additional support but was not an essential feature. Added to these diagnostic points is the dramatic response to arsenical drugs.

In a discussion on the differential diagnosis, Loeffler's syndrome is dealt with in some detail : the author considers it an essentially different disease of allergic origin. Its transitory and self-limiting nature clearly differentiates it from eosinophilic lung.

The author bases his description of the pathology of the condition mainly on the observations of other workers, including VISWANATHAN [this *Bulletin*, 1947, v. 44, 753]. He emphasizes the latter's conclusion that the appearances suggest an infection process rather than an allergic phenomenon.

The aetiology is discussed under the various headings of the suggestions that have been put forward as the cause of the condition, namely helminthic infections—*Ascaris*, *Strongyloides*, *Schistosoma*, and filariae, spirochaetal infection, virus infection, mite infestation, and allergic origin, each of which he more or less dismisses on the evidence of his series.

Under an additional heading, " infective ", he writes :—

" The present trend of opinion, and that of the writer's, is to regard Eosinophilic Lung as a specific infection rather than a peculiar reaction to a variety of agents. Case 145 of this series points to the possibility of direct spread of a infection from neighbouring patients ; also, the occurrence in members of family living in the same house suggests an infection. The prompt clinical and haematological response to arsenic implies a specific arsenic sensitive organism as the aetiological factor. Parenteral arsenic had no effect on the eosinophilia of 10 cases of allergic bronchial asthma, one case of pulmonary tuberculosis and one case of Hodgkin's disease. That the blood reaction is an eosinophilia, need not rule out an infective theory, for leucocytic response to infection is not always polymorphonuclear ; in whooping cough there may be a marked lymphocytic leucocytosis, and in infectious mononucleosis, it is the mononuclear cells that are increased."

The monograph, which concludes with a useful bibliography of over 150 references, in an important contribution to the literature of this subject.

L. E. Napier

PROTOZOOLOGY : GENERAL

SHORTT, H. E. **The Impact of Protozoa on World Economic Problems.** *Brit Med. J.* 1951, Nov. 10, 1103–10.

In a lecture forming part of the Festival of Britain programme organized jointly by the British Medical Association and the Royal Society of Medicine,

the author gives an interesting account of the influence of protozoa upon the welfare and economic life of mankind. Among the problems facing humanity is the provision of adequate food supplies to an increasing population, which necessitates, on the one hand, an expansion of agriculture and animal husbandry, and, on the other hand, the protection of crops and livestock from ravages due to diseases, among which those caused by protozoa occupy an important place.

To illustrate the bearing of these diseases upon our economic life, the author has chosen cattle trypanosomiasis and piroplasmosis, and human malaria. It has been estimated, as an Editorial in the same number of the *Journal* states, that in West Africa alone, deaths among cattle due to trypanosomiasis cause an economic loss of one million pounds annually. This leads to diminished vitality of the African population, owing to serious deficiency of their diet in high-grade protein, and to deterioration of the soil due to the absence of beasts for draught and work. These factors are responsible for a progressive impoverishment of the people, while the existing policies are encouraging a steady growth of the population. To this should be added the indirect losses due to the exclusion of livestock from potential grazing grounds, which are now infested by tsetse-flies and game animals infected with trypanosomes. These restrictions also lead to overstocking of existing pastures, bringing about soil erosion.

As regards piroplasmosis, in Kenya alone East Coast fever is responsible for more than 50 per cent. of all parasitic infections in a cattle population numbering between five and six million. The death rate from this disease in cattle is higher than from all other causes put together, reaching 95 per cent. in South Africa. The effect of malaria on the community is illustrated by the conditions in India, where it is thought to cause one million deaths a year, with an annual incidence of one hundred million, as is stated in the same Editorial. The economic consequences of malarial infection are manifold, for, by undermining the health of the people, it affects both individual and collective activities with considerable loss of efficiency and man-hours of work, and disastrous effects on agriculture, industry and social services.

This state of affairs can be dealt with by appropriate counter-measures of control and treatment, but the author warns us that these should not be undertaken without considering the consequences of interference in the complex relations between man and his environment, otherwise a vicious circle may be created. Thus, the reclamation of a locality by elimination of trypanosomiasis or piroplasmosis might lead to its overstocking, followed by soil erosion. Control measures should, therefore, be carefully planned beforehand.

C. A. Hoare

RODHAIN, J. Infection expérimentale par toxoplasme de la marmotte en sommeil hivernal. [**Experimental Infection of the Hibernating Marmot with** *Toxoplasma*] *Ann. Soc. Belge de Méd. Trop.* 1951, Aug. 31, v. 31, No. 4, 487–93.

Some workers have observed that hibernating marmots and dormice were refractory to trypanosome infections, to which they are normally highly susceptible. In a previous paper, the author with HENDRIX [this *Bulletin*, 1950, v. 47, 89] has recorded a spontaneous infection of the marmot (*Arctomys marmota*) with *Toxoplasma*. With a view to determining the behaviour of this parasite in hibernating marmots, he inoculated one of these animals, shortly after it had become dormant, intraperitoneally with 0·5 cc. of the peritoneal fluid from a mouse infected with a squirrel strain of *Toxoplasma*. The marmot emerged from hibernation after 3 months and died 18 days later, as the result

of toxoplasmic infection. On autopsy, numerous toxoplasms were found in the spleen, liver and lungs, but few in the brain. For comparison, an active marmot was similarly inoculated with toxoplasms ; this animal succumbed 22 days later, with parasites appearing in the blood 4 days before death. The survival of the parasites in the hibernating marmot is thought to be due to their intracellular localization in its tissues, while the latency and innocuousness of the infection is attributed to lowering of the body temperature of the host.

C. A. Hoare

WESTPHAL, A. Eine neue Toxoplasmose-Komplementbindungsreaktion. [**New Complement-Fixation Test for Toxoplasmosis**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, Oct., v. 3, No. 2, 191–204. [14 refs.]

Hitherto the preparation of antigen for the complement-fixation test in toxoplasmosis has been handicapped by the presence in the extracts of elements of the host's tissue accompanying the parasites. The author has overcome this difficulty and succeeded in obtaining toxoplasm antigen free of extraneous elements, in the following way : (1) The peritoneal cavity of infected mice is rinsed with 3·8 per cent. sodium citrate solution and the diluted exudate is withdrawn. (2) To remove extraneous cells and tissue elements, the exudate is ground and filtered through gauze, then more citrate is added and it is filtered again. (3) The suspension is centrifuged at 2,000–3,000 r.p.m. for 20 minutes, to separate the fluid from the cells, and the sediment is re-suspended in citrate : the citrate-ions convey a negative charge to all cells, thereby promoting their dispersion. (4) The last suspension (containing the exudate of 5 mice in 8 cc. citrate) is placed in a thin-walled glass vessel and exposed to the action of ultrasonic waves, which cause dissolution of the protoplasm of the leucocytes, releasing their positively charged nuclei. By adsorption of the negative citrate-ions, the nuclei reach the iso-electric point, and form clumps ; these rise to the surface, while the larger tissue elements fall to the bottom, leaving the negative toxoplasms in suspension. This separation is completed in 2–3 minutes, after which the toxoplasm suspension is decanted. Any remaining leucocyte clumps are removed by centrifugation at 500 r.p.m. for 1 minute, after which the toxoplasms are completely freed from the dissolved cells by centrifugation at 3,000–4,000 r.p.m. (5) After the supernatant fluid is decanted, the sediment is suspended in saline (0·5 cc. per mouse), and the suspension is exposed for 20 minutes to ultrasonic waves, which cause disintegration of the toxoplasms. (6) The resulting mixture is diluted with an equal volume of 1 per cent. phenol solution in saline and left for about a week in a refrigerator for extraction, after which the undissolved remains of the toxoplasms are separated from the antigen extract by centrifugation for 20 minutes. (7) The extract is then treated with 0·5 per cent. phenol at 56°C. overnight to destroy the anti-complementary components while retaining the antigenic components. (8) Finally, the extract is standardized against a known antigen ; for this purpose 25 per cent. of saline is added, thereby reducing the phenol content to 0·4 per cent. In this concentration the antigen-extract is preserved in the refrigerator and does not subsequently deteriorate even after prolonged keeping at room temperature.

With this antigen routine complement-fixation tests can be carried out by the usual technique, which is described in some detail. Tests for the specificity of this reaction have shown agreement with the results of the Sabin-Feldman dye test in numerous animal experiments and in human cases. However, it was found that animals infected with non-pathogenic trypanosomes of the *lewisi*-group also gave a positive complement-fixation reaction. It is noted that in

infants suffering from toxoplasmosis the specific antibodies are frequently absent : in such cases a positive reaction of the mother's serum should be taken into consideration, and a skin test should be made on the child.

C. A. Hoare

STROBEL, W. Ein Beitrag zum Krankheitsbild der Säuglingstoxoplasmose und klinische Stellungnahme zum Sabin-Feldman-Test. [**Toxoplasmosis in Sucklings : the Clinical Picture and the Value of the Sabin-Feldman Test**] *Deut. med. Woch.* 1951, Nov. 16, v. 76, No. 46, 1433–6, 3 figs. (2 on pl.)

Here described are 2 cases of toxoplasmosis in which the diagnosis was confirmed after death by the demonstration of the causative organism in the brain, spinal marrow, lungs and liver. The mother of the first patient, a primigravida, had come into close association with a dog and cats during her pregnancy. Her infant was admitted to hospital on the 20th day of life, because of vomiting. The child had been blue since birth, and although taking food, had always been sleepy. It was found to have marked hydrocephalus, microphthalmos and cataract with other changes in the eyes, enlargement of liver and spleen, and the characteristic calcification changes in the skull were seen on X-ray examination. Cyanosis increased, tonic-clonic spasms of the left side of the body set in and the child died after 5 days in hospital. The second patient was admitted on the 24th day of life and lived till the 43rd day. It was admitted because of muscular spasms of arms and legs. On examination hydrocephalus was found, and papilloedema and chorioretinitis were discovered. In both cases the changes found postmortem were those of encephalomyelitis.

Tests were not carried out on the children's sera but both parents of the first patient gave a positive complement-fixation reaction (Westphal) and the Sabin-Feldman test was positive in the mother of the second patient.

Description of these cases leads to a discussion of the positive value and the shortcomings of the Sabin-Feldman test, in the light of the author's experience of this test. *M. E. Delafield*

MARIANI, G. Sull 'infezione sperimentale da toxoplasma e su un protozoo di incerta classificazione. Nota preventiva. [**Experimental Infection with *Toxoplasma*, and on a Protozoon of Uncertain Systematic Position**] *Ann. d. San. Pubblica.* Rome. 1951, Jan.–Feb., v. 12, No. 1, 13–17, 2 figs. English summary (7 lines).

The author has compared human (Holland) and guineapig (Abyssinia) strains of *Toxoplasma* in serial passages through laboratory rodents, but found no morphological or biological differences between them. In the course of their development, occupying 24–48 hours, the fusiform or crescentic young parasites increase in size and become piriform or rounded, after which they undergo longitudinal binary fission. The infection in guineapigs, lasting 7 days, is mortal, but it is less virulent to rabbits and calves, while mice are sometimes resistant.

In the course of these experiments the author found in the blood of mice peculiar large crescent-shaped organisms, comparable to the haemogregarine-like bodies described from man by ARCHIBALD and SUSU [this *Bulletin*, 1924, v. 21, 775]. The nature of the two organisms, which are depicted side-by-side, could not be determined. [Judging from the figures, the organism seen by the author bears some resemblance to spores of Sarcosporidia, which occasionally contaminate a blood film in the course of its preparation.] *C. A. Hoare*

Mühlpfordt, H. Das Verhalten Sarcosporidien-infizierter Tiere im Sero-Farbtest auf Toxoplasmose nach Sabin-Feldman. [**The Response of Animals Infected with Sarcosporidia to Sabin-Feldman's Dye-Test for Toxoplasmosis**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, Oct., v. 3, No. 2, 205–15. [Numerous refs.]

Since Sarcosporidia are commonly confused with toxoplasms, the author has employed Sabin and Feldman's dye-test in an endeavour to differentiate infections with these two parasites by serological methods.

For this purpose " Miescher's tubes " with *Sarcocystis* recovered from gullet muscles of sheep or goats were inoculated (*per os* or intraperitoneally) into guinea-pigs, rats and hamsters, and the serum of these animals was tested by the dye-test against toxoplasms. In all cases, preliminary tests made before the inoculation with sarcosporidia produced negative results, but after the infection was allowed to establish itself the animals reacted positively, thus showing that the antibodies reacting with the toxoplasms were produced by the sarcosporidial infection.

Tests were then carried out with the sera of 45 sheep. In 26·6 per cent. of the animals both the reaction was positive and sarcosporidia were demonstrated, while in 22·2 per cent. the reaction was positive in the absence of detectable parasites ; in the remaining animals the results of both the parasitological and serological examinations were negative. Since sarcosporidia are not restricted to the gullet—which is the site for routine examination—it is inferred that in Hamburg 48·8 per cent. of sheep are infected with sarcosporidia.

From this investigation it follows that sarcosporidiosis cannot be differentiated from toxoplasmosis by the dye-test. *C. A. Hoare*

Atchley, F. O. *Leucocytozoon andrewsi* **n.sp., from Chickens observed in a Survey of Blood Parasites in Domestic Animals in South Carolina.** *J. Parasitology.* 1951, Oct., v. 37, No. 5, Sect. 1, 483–8, 3 figs.

" 1. A total of 1,638 domestic animals of several species were examined for blood parasites in Clarendon County, South Carolina. No finding was made which could be correlated immediately with the unknown sporozoites occasionally observed in wild-caught anopheline mosquitoes in the same area.

" 2. The parasite described above from the domestic chicken (*Gallus gallus*) in South Carolina is designated *Leucocytozoon andrewsi* n.sp., in honor of Dr. Justin M. Andrews."

Rodhain, J. & Demuylder, C. L'hémoglobinurie des rongeurs infectés de *Babesia rodhaini*. [**Haemoglobinuria in Rodents infected with** *Babesia rodhaini*] *Ann. Soc. Belge de Méd. Trop.* 1951, Oct. 31, v. 31, No. 5, 551–63, 4 figs. on 2 pls.

ENTOMOLOGY AND INSECTICIDES : GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Rozeboom, L. E. **A New Species of** *Anopheles* **from the Philippine Islands (Diptera : Culicidae).** *J. Parasitology.* 1951, Oct., v. 37, No. 5, Sect. 1, 502–6, 16 figs. on pl.

Peterson, D. G. & Brown, A. W. A. **Studies of the Responses of the Female** *Aëdes* **Mosquito. Part III. The Response of** *Aëdes aegypti* **(L.) to a Warm Body and its Radiation.** *Bull. Entom. Res.* 1951, Nov., v. 42, Pt. 3, 535–41, 1 text fig. & 2 figs. on pl.

This paper, one of a series of studies in mosquito behaviour, is concerned with the reaction of *Aëdes aegypti* to warmth. The mosquitoes were confined in a

large cage of 360 cu. ft. capacity. The sources of warmth were two billiard balls which were mounted on brass rods and fixed, 8 inches apart, on a board suspended in the cage. This board was 4½ feet from the floor. The billiard balls were warmed in water for 30 minutes, one being warmed to a temperature 20°F. in excess of the other. The number of mosquitoes touching each of the two balls over a one-minute period was counted. The position of the warmer ball was changed between experiments and two series were carried out, one with black balls and another with white balls. The results show that 110°F. is significantly more attractive than higher or lower temperatures.

To determine the relative importance of convection and radiation, similar experiments were performed in which the billiard ball was introduced into a chamber closed off from the cage except for a window of infra-red transparent thallium bromoiodide. The number of mosquitoes landing on this filter was not significantly greater with the warmed billiard ball present than with no source of heat. Radiated heat is thus of little importance in attracting *Aëdes aegypti*.

A Leslie cube with faces having surface treatments of different emissivities was filled with water maintained at 92°F. and the reaction of mosquitoes to the different faces was observed. The only significantly high attraction was obtained with black enamel in comparison with flat black paint, white paint and white enamel. There was no significant difference between black and white paint, although previous experiments showed that a black billiard ball was more attractive than a white one.

The light and heat emission rates from the different surfaces were compared and the relative values are quoted. These experiments confirm that radiated heat is not important in the behaviour of *Aëdes aegypti*. *A. J. P. Goodchild*

Brown, A. W. A. **Studies of the Responses of the Female *Aëdes* Mosquito. Part IV. Field Experiments on Canadian Species.** *Bull. Entom. Res.* 1951, Nov., v. 42, Pt. 3, 575–82, 4 figs. on pl.

This paper describes field experiments based on knowledge acquired in earlier laboratory experiments on mosquito behaviour. Two robots were constructed to resemble human beings in shape, warmth, and clothing. Each consisted of a stainless steel tank 24 inches high, and holding 100 lb. of water warmed to body temperature. It rested on a stand 26 inches in height. The apparatus included a heater, thermostat, and electric stirrer, connected by 200 ft. of cable to a generator. The consumption of electricity needed to maintain a temperature of 98°F. was found to be 50 watts, about that of a resting adult human being.

Clothing consisted of a shirt of felt 0·3 inch thick, over which was a black crêpe jerkin. When colours were compared, pieces of coloured cloth 2 ft. by 4 ft. were tied around the robots over the felt shirt.

When the effect of CO_2 and other vapours was studied, the robot was given a head consisting of a water-closet ball-float, wrapped with felt and crêpe and having a ⅜-inch hole simulating the mouth. Air or CO_2 were introduced *via* a hole in the opposite side, the rate of flow being measured by a flow-meter.

Two sites were used for experiments, one a deep wooded valley near Barrie, Ontario, with poplar, birch, maple and some hemlock, and the other a wooded valley at Goose Bay, Labrador, with balsam fir and black spruce. The mosquitoes at the first site were *Aëdes intrudens*, *A. trichurus* and *A. stimulans*, while those at the second site were *Aëdes punctor*, *A. pionips* and *A. communis*.

The observers, who stood at a distance of 20 feet and used no repellents, recorded the number of mosquitoes landing on each robot in two-minute periods. The counts were standardized to permit statistical analysis.

Moist clothing (wetted and wrung out until it ceased to drip) increased the attractiveness of a warm body 2 to 4 times when the air temperature exceeded 60°F. but decreased it below that temperature, although the surface temperature of moist clothing was 1–3°F. higher than dry clothing. A robot at 98°F. was 3 times more attractive than one at 50–65°F. internal temperature. Carbon dioxide emitted from an artificial head almost doubles the attractiveness, while ether and gasoline were significantly attractive. A sweat-soaked jerkin was more attractive than a water-soaked one. Light colours and glossy materials were less attractive than dark colours or matt materials. Luminescent dyes decreased the attractiveness of cloths, and the colour green was found to be less attractive than red or blue. A greenish-khaki nylon was found to be much less attractive than khaki drill or cotton. There was no evidence of interspecific differences in the reactions of the mosquitoes.

The paper is illustrated by 4 photographs. *A. J. P. Goodchild*

Li, H. H. & Feng, L. C. **Morphological Studies of the Common House Fly, *Musca vicina*, in China.** *Peking Nat. Hist. Bull.* 1950–51, Dec.–Mar., v. 19, Pts. 2/3, 278–84, 6 figs. on pl. [17 refs.]

The authors have examined specimens of house-flies caught in the following Chinese towns : Peking, Tsinan, Changsha and Shanghai. They give descriptions of fresh specimens and have examined the male terminalia. The width of the male frons was compared with the width of the third antennal segment in 18 to 27 specimens from each of the above localities. According to James (*U.S. Dep. Agric. Misc. Publ.* No. 631, 1947), a ratio of 3 or more is characteristic of *domestica* and a smaller ratio denotes *vicina*. The ratios found in the Chinese flies averaged 2·13 (max. 2·47 ; min. 1·77). Largely on this criterion, the authors conclude that their specimens are *M. vicina* and that this species is the common fly of China as far north as Peking. They state that no specimens of *domestica* were caught, but admit that the numbers examined were not large. *J. R. Busvine*

Schoof, H. F., Siverly, R. E. & Coffey, J. H. **Dieldrin as a Chemica Control Material on Community Fly Control Programs.** *J. Econom. Entom.* 1951, Oct., v. 44, No. 5, 803–7, 3 figs.

In 1948, the Communicable Diseases Centre (Atlanta, Georgia) began a programme of fly control in five American cities, to determine the possible status of domestic flies as vectors of poliomyelitis. The places chosen were Phoenix, Arizona ; Topeka, Kansas ; Charleston, Virginia ; Troy, New York ; and Muskegon, Michigan. [Populations are not stated.] House spraying with DDT was begun in 1949, but it soon became clear that this was ineffective, owing to DDT-resistance among the house-flies. Accordingly dieldrin was introduced in 1950 at rates of 25 and 50 mgm. per sq. ft., applied from emulsions of 0·625 and 1·25 per cent., respectively. The towns to be treated were divided into areas of different types. The less sanitary districts were sprayed throughout, with special attention to refuse dumps, abattoirs, etc. In the better residential and business sectors, spraying was confined to focal points such as garbage stations and animal shelters.

The results were assessed by numerous counts of flies resting on a wooden grill (" Scudder grill ") placed in certain rooms. Comparative counts were made in other, untreated, towns. The data show that good control of flies was achieved in Charleston, Topeka and Troy throughout the summer months by both rates of dieldrin. (Average number of flies resting on the grill were 2 or

3 compared with 10 to 40 in untreated towns.) In Phoenix, some dieldrin spraying was done successfully in late summer of 1949. Early treatments were also successful in 1950, but later in the summer the flies increased enormously. Even additional treatments did not prevent numbers reaching 150 flies per grill, which was above the figure for the control town. Laboratory investigations proved that the flies had acquired a high degree of resistance to dieldrin.

This rapid acquisition of resistance to dieldrin must limit the value for fly control, even though reports from certain areas in Texas state that it has been used successfully for two years. *J. R. Busvine*

NÁJERA, L. E. La oviposicion del *Ornithodoros erraticus* (Lucas, 1849) en condiciones experimentales y algunas observaciones sobre su biologia. [**The Oviposition of** *Ornithodorus erraticus* **under Experimental Conditions and some Observations on its Biology**] *An. Med. Pública.* Santa Fe. 1950, v. 2, Nos. 3/4, 503–29, 3 figs. on pl. & 3 diagrams. [25 refs.] English summary (9 lines).

A strain of *O. erraticus* was established in a Madrid laboratory from specimens collected from a pigsty in the late autumn. The pig is stated to be the host in these surroundings, but the host used in the experimental feeds is not indicated.

Much of the early part of the paper deals with the method of storing the ticks (in corked tubes on damp filter paper), reviews of some of the literature on the breeding habits, and parasitological importance of the genus, and lists the species of *Ornithodorus*, including synonymy. It was found that moribund specimens could be activated by warmth, and that evidence of life could also be obtained from slight pulsating movements visible at the base of the capitulum.

Observations on the oviposition of 30 specimens were made over the period June–September, 1947. The results are discussed in the text and presented clearly in numerous tables showing the total number of eggs laid by each tick, and the frequency of laying in time and in relation to the first or subsequent blood meals, where these were taken. Eleven of the ticks failed to survive the whole period of the observations. The number of eggs per female varied from 23 to 250, the number laid per day varying from fewer than 10 to 153. Oviposition began 6 to 54 days after a blood meal. No female died earlier than 38 days after a blood meal. Oviposition in some ticks occurred in two main periods separated by 20 to 47 days. Each of the two periods of oviposition varied from one to as many as 16 days, but, in the longer periods, eggs were generally laid for a few successive days followed by days when no oviposition occurred.

The photographs show an ovipositing female, a batch of eggs, and the vulva of a female. *D. S. Bertram*

RYCKMAN, R. E. **Recent Observations of Cannibalism in** *Triatoma* **(Hemiptera : Reduviidae).** *J. Parasitology.* 1951, Oct., v. 37, No. 5, Sect. 1, 433–4.

CHIEFFI, G. Su un caso di linguatulosi umana. [**Human Infection by** *Linguatula serrata*] *Acta Med. Italica.* 1951, Aug., v. 6, No. 8, 212–18, 2 figs. [30 refs.] English summary (9 lines).

Linguatula serrata is rarely found in its adult stage in man ; it is more common in carnivorous animals, especially the dog, in which it occurs in the nose and is discharged with the nasal secretions and when ingested by another animal (rarely man) the larva is set free and develops in the liver or mesenteric glands.

The author gives a detailed account of its life-history and discusses the views which have been held as to its place in nature and then describes the present case.

The patient was a woman of 28 years suffering from pulmonary tuberculosis ; she was also infested with *Ascaris* and *Enterobius*. One evening in January 1949 she felt a foreign body on the tip of her tongue and noticed that it moved ; it seemed to cling to the surface when she tried to remove it and it continued to move after she had extracted it. She suffered rather severely from cough, owing to the pulmonary condition. She was treated with streptomycin and later a right-sided pneumothorax was performed. In early June, after a severe bout of coughing, she experienced in her mouth a sensation like that of the preceding January, but this time on the buccal aspect of the left cheek and she observed a similar parasite which she squashed (*schiacciò*) between her fingers. A fortnight later she found another in the mucosa of the lower lip ; she removed it and placed it in spirit.

How the patient acquired the infection is doubtful ; whether she ingested the eggs in green food, playing the part of intermediate host, or whether, by eating badly cooked rabbit or lamb, she acted as definitive host. This is said to be the second case recorded in Italy and only the fourth in all literature.

Being unable to obtain Linguatulids the author prepared an antigen with the Acarus, *Tyroglyphus farinae*, and tried an intradermal test in this patient, with a positive result, a weal developing and a pruriginous erythema, 5 cm. in diameter, retrogressing in half an hour and, 8 hours after, a red papule, 5 cm. in diameter appeared, fading in 48 hours. [The author does not explain the rationale of this reaction in Linguatulid infection, but adds that he tested it in 20 patients with pulmonary tuberculosis and obtained one positive, though there was no reason to think there was any Linguatulid infection in this patient.]

H. Harold Scott

Castresana Garćia, M. Afecciones oculares producidas por insectos y otros parásitos. [**Ocular Infections caused by Insects and Other Parasites**] *Med. Colonial.* Madrid. 1951, Sept. 1, v. 18, No. 3, 222–32, 3 figs.

A very general discussion of the subject, dealing mainly with eye conditions following irritation by the hairs of certain caterpillars, the attachment of ticks (and ants) to eyelids, and the venom of spitting cobras. Indications for treatment are given and the symptomatology and pathology are described. Although numerous other writers are cited no references are provided. The figures are indifferent.

D. S. Bertram

Su, S. C. **" Brown Oil ", a Camphor Oil By-Product, as a Solvent of D.D.T.** *Peking Nat. Hist. Bull.* 1950–51, Dec.–Mar., v. 19, Pts. 2/3, 259–62.

In the search for a solvent for DDT to replace kerosene, " Brown oil ", a camphor by-product containing terpinnenol and 50 per cent. safrol, was found suitable. It was found to be non-inflammable, and non-poisonous to rice plants, although burning the leaves temporarily. Solubility of DDT in " Brown oil " varied considerably with temperature, 45 gm. dissolving in 100 cc. if added slowly and heated to 66°F. The addition of 4 cc. Triton X-100 gave a 33·08 per cent. solution which, with 1 gallon of water, made sufficient emulsion to spray ½-acre of rice fields, killing all mosquito larvae in 1 hour, although a few live pupae remained.

Ruth Nash

Herms, W. B. **Medical Entomology.**

This book is reviewed on p. 335.

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

SCOTT, H. **Some British Contributions to Tropical Medicine.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Oct., v. 45, No. 2, 158–74.

This lecture was one of those arranged by the Royal Society of Tropical Medicine and Hygiene as a contribution to the Festival of Britain. Sir Harold Scott began by stressing the difficulty of covering so large a field in so short a time, and a like difficulty besets anyone attempting to review his admirable discourse. The development of tropical medicine, he pointed out, passed through three stages. In the first, early colonizers went out to trade for their own advantage, and medical men accompanied them to attend them when sick ; in the second, precautions were taken to safeguard the colonists from incursion of disease from the natives working for or with them ; in the third, a study of these diseases was undertaken with a view to their eradication among the indigenous populations. Owing to their insular position and an inborn love of adventure, the British have always been eager explorers and colonists, thus coming into early contact with tropical diseases, and suffering much in consequence. A *Handbook of Useful Information* included a chapter on " How to Reach West Africa and How to Return ". The section on the return began with the laconic statement, " If dead, this will not be needed ", which indicates the ravages of disease that the pioneers set themselves to combat in Africa and elsewhere, and the maladies forever linked with the names of workers and investigators of British stock make a long list—scurvy, malaria, plague, cholera, filariasis, trypanosomiasis, relapsing fever and kala azar among many others, for there is hardly any tropical disease to which some material contribution has not been made by a British worker.

It is impressive to read here how often the deductions made by far-seeing men in the past have found scientific confirmation in our own day. Laymen, too, took a share in advancing knowledge, like old Sir Richard Hawkins who in 1591 proved the value of oranges and lemons in averting scurvy in his crew. Again and again, unfortunately, some valuable piece of knowledge painfully acquired in one age was afterwards completely forgotten, and Sir Harold mentioned that as far back as A.D. 610 the Chinese term for plague was Shu-yi, that is " rat pest ". Readers may recall in this connexion that in the 1st century B.C., Strabo associated pestilential disease with " mice " (in all the Aryan languages except the Germanic group, the word for mouse was also used for rat), and added that in spite of the efforts of " mouse-catchers " who were paid graded bounties proportionate to the number of " mice " they destroyed, the Romans in Spain barely came through the pestilence with their lives. And earlier still, the Philistines of biblical times attributed their epidemic of plague to the " mice that mar the land ".

Sir Harold described also how the art of distilling drinking water from sea-water was alternately practised and lost. Here again that stout sea-dog Hawkins showed himself a leader endowed with originality and resource, for when on his long voyage in the *Dainty* in 1593, the supply of drinking water failed " I easily drew out of the sea sufficient quantities of fresh water . . . for with four billets I stilled a hogshead of water . . . [which] was found to be wholesome and nourishing." Captain Cook also distilled water in the same way, as Lind had done before him. Yet in spite of all these instances of priority (as well as Ralegh's successful experiment during his long imprisonment in the Tower), Parliament later voted one Dr. Charles Irving a reward of £5,000 as the supposed discoverer of this process of distillation !

A final word of warning was given, not to underestimate Nature nor to forget her powers of resilience. We thought we had conquered yellow fever when we

found the vector *Aëdes aegypti* and the mode of conveyance, but she came back at us with her rural and jungle form. Horace's words are as true today as ever—you may drive Nature out with a pitchfork, he says, yet she will always come back. *W. P. MacArthur*

CONGO BELGE. Direction Générale des Services Médicaux. Rapport annuel 1950. [**Annual Report of the Medical Directorate-General**] 89 mimeographed pp., 1 chart.

In the introduction to the Annual Report of the Medical Directorate General of the Belgian Congo for 1950, it is stated that the establishment was increased from 552, of which 231 were doctors, in 1949 to 620, with 238 doctors, in 1950. It may be said, so far as doctors and medical assistants are concerned, that the difficulties of previous years have been largely surmounted and that requirements are being met by adequate recruitment. There is still some shortage of nurses and certain specialists.

The development of medical planning has proceeded and soon each territory of the Colony will be provided with a rural hospital in a complete medical centre ; such hospitals should have 150 beds, with a possible extension to 300, and also 6 beds each for Europeans. Those already in existence and under construction are listed.

Co-operation with other African territories, Portuguese, French, British and South African, continues.

Control of insect vectors of disease is a major project and is being developed in several different areas, both on land and from the air.

The body of the Report contains the usual careful and detailed account of the medical services, governmental and auxiliary. The following points of interest are noted.

There were 18 cases of *plague* all fatal, in the Lake Albert focus and 16, with 12 deaths, in the Lake Edward region. In the former, the numbers of bubonic, septicaemic and pulmonary cases were 3, 12 and 3 and in the latter, 2, 4 and 10. Inoculation was carried out in 36,348 and 286,252 cases respectively, and over one million rodents were destroyed.

There were only 2 cases of *yellow fever*, both in Africans, both fatal and both occurring in the Bondo area of the Eastern Province.

Smallpox accounted for 13 cases in Europeans, with no deaths. There were 653 cases in Africans, with 3 deaths. Altogether, over 600,000 people were vaccinated and more than 1½ million were revaccinated.

Fevers of the *typhus* group (classified under the general heading of " *Typhus Exanthématique, Fièvre Exanthématique, Fièvre Boutonneuse* ") were reported in 62 Europeans, with 1 death and 145 Africans, with 6 deaths.

There were 213 cases of *cerebrospinal meningitis* in Africans : 69 were fatal.

Bacillary dysentery occurred in 484 Europeans (2 fatal) and 1,087 Africans (76 fatal).

Poliomyelitis was most serious in Léopoldville and Kivu, where there were respectively 165 cases (5 in Europeans) and 13 deaths (1 European) and 115 (3) and 6 (0). In addition, cases in other Provinces amounted to 6 European and 54 African ; no deaths occurred in these Provinces.

Malaria accounted for 4,431 cases with 7 deaths in Europeans and 217,995 with 614 deaths in Africans, giving death rates of 0·15 and 0·28 per cent. There were 30 cases of *blackwater fever* (1 fatal) in Europeans and 29 (3 fatal) in Africans.

Trypanosomiasis occurred in 10 Europeans, 8 of them in Léopoldville Province : there were no deaths. In Africans, 6,109 new cases were reported, giving an index of new infections of 0·11, compared with 0·15 in 1949 and 0·21 in 1948. Altogether 43,470 cases were treated. Improvement in the situation was reported in all areas, except in the Eastern Province, where the index of new infection rose from 0·01 to 0·07. The excellent results of pentamidine prophylaxis are noted and the value is stressed of the co-operation with neighbouring colonies.

There were 244,570 cases of *yaws* treated : 2 were in Europeans.

Tuberculosis was seen (in Government institutions) in 58 Europeans and 2,972 Africans : 615 of the latter died. In " itinerant services ", 4,833 more cases were treated.

There were 4 cases of *leprosy* in Europeans and 71,850 affected Africans came to treatment. Detailed figures are given for the leprosaria and " *villages agricoles* ", which are proving satisfactory. It is stated that endemic leprosy remains stationary. Note is made of the encouraging results given by DDS and also by TB1 combined with streptomycin.

There were 3 cases of *relapsing fever* in Europeans and 562 in Africans, with 5 deaths.

Amoebic dysentery occurred in 637 Europeans and 8,554 Africans : 99 of the latter died.

Helminthic diseases were reported in 1,405 Europeans : 203 of these were hookworm disease. The figures for Africans were 271,261 and 125,529.

Rectal *schistosomiasis*, as seen in Government institutions, occurred in 89 Europeans and 8,746 Africans : vesical schistosomiasis accounted for 6 and 878 cases. Thirty-six Africans died from the rectal form. Mobile teams in Kasai Province found 7,386 new cases out of 297,480 examinations (2·48 per cent).

Filarial diseases are reported as follows :—

	O. volvulus	*Loa loa*	*W. bancrofti*	*A. perstans*	Non-specified
Europeans	1	59		2	169
Africans ...	876	888	6	57	7,601

There were 58 cases of *rabies*, 1 in a European [but as only 15 deaths are recorded, it is presumed that the others were suspected rabies].

The remainder of the Report follows the usual lines and describes the various activities in great detail including those of the many missionary and philanthropic bodies which are such an admirable feature of the medical and social services in the Belgian Congo.

[For the 1949 Report see this *Bulletin*, 1951, v. 48, 594.]

H. J. O'D. Burke-Gaffney

Gongora Triay, B. Apuntes y notas sobre los principales problemas sanitarios del Estado de Yucatán. [**Notes on the Main Sanitary Problems of the State of Yucatán, Mexico**] *Medicina*. Mexico. 1951, Nov. 10, v. 31, No. 639, 431–7.

The main problems, from the sanitary point of view, in Yucatán are enteric fevers, malaria, intestinal parasitism and enteritis. The chief endemic centre of *typhoid fever* is the town of Mérida. Figures are given for the ten years 1941–50 ;

the number of cases per 100,000 inhabitants was highest, 459·07, in 1942, but in 1950 had fallen to 116 cases notified, or 112·73 per 100,000. The drop is attributed to widespread use of TAB vaccination. The water supply, largely subsoil and river water, is plentiful but unsafe and liable to pollution and carriers of the organism are many, " some 50 per cent. of those with a history of the disease during the preceding year ", and flies abound. Of the 116 cases reported in 1950, 28 were under 7 years of age, 36 between 7 and 14, and 52 above that age. During the quinquennium 1946–50 there was a total of 855 cases and 100 deaths (11·7 per cent.).

Malaria is of great importance ; how great it is difficult to say because the official figures are far below the true incidence. In 1942 the number recorded was 4,425 ; in 1948 2,041, but in 1950 only 414. The inhabitants of Mérida itself are not much affected ; the majority of infections are by *P. vivax*. Three cases with unusual and misleading symptoms are reported in detail : one with loss of eyebrows and considerable areas of insensibility was at first diagnosed as a case of leprosy, but the organisms could not be found ; *P. vivax* was seen in large numbers and the symptoms cleared up on anti-malaria treatment. The second suffered from epileptiform convulsions and severe headaches ; tests for syphilis were negative and, again, anti-malaria treatment put a stop to the fits and the headaches. The third suffered in succession from facial neuralgia, testicular pain, gastro-intestinal disturbance and intense lumbar pain, each clearing up with anti-malaria treatment. Generally speaking, of 1,000 positive films, 78·6 per cent. contained *P. vivax*, 21·4 per cent. *P. falciparum*, " *P. malariae* and *P. ovale* are exceptional ".

Of 6,402 faecal specimens examined for *intestinal parasites*, 3,606 harboured more than one, 1,568 one only, and 1,128 had none [these total 6,302]. The commonest was *Ascaris* (2,372 is the figure given), *Trichuris* next (2,297), amoebiasis third (2,217) and *Trichomonas* fourth (1,987). Deaths from amoebic dysentery during the six years 1945–50 are stated ; they are not numerous, the figures being 13, 1, 6, 2, 7 and 9 respectively. Ankylostomiasis is said to have been rare until a few years ago and then all were imported cases ; it is now becoming more common and the resulting anaemia is severe and refractory to treatment. Giardiasis is common and is associated with intestinal colic and diarrhoea, but is readily amenable to treatment with acridines. *Enteritis and diarrhoea*, accompanied by abdominal pain, cramps and chills, occur in outbreaks ; the cause is not known with certainty, but is probably alimentary. It is evidently serious, for during the five years to 1950 the number of fatal cases has ranged between 1,493 (in 1947) and 1,298 (in 1950) and the numbers per 100,000 inhabitants between 337·58 and 287·1. *H. Harold Scott*

J. Parasitology. 1951, Oct., v. 37, No. 5, Sect. 2 (Suppl.), 59 pp. **Program and Abstracts of the Twenty-Sixth Annual Meeting of the American Society of Parasitologists, Chicago, Illinois, November 15, 16, 17, 1951.**

The abstracts presented to the 25th Annual Meeting of the American Society of Parasitologists were referred to in this *Bulletin*, 1951, v. 48, 418.

The 1951 programme contains 86 abstracts or titles of papers submitted to the meeting. Those which readers of this *Bulletin* will find particularly relevant include short abstracts relating to the growth and metabolism of entamoebae (6), to other intestinal protozoa (2), *P. falciparum* (1), avian malaria (3), *P. berghei* (1), trypanosomes and leishmaniae (5), toxoplasms (1), schistosomes (4), *Paragonimus* (1), molluscs and molluscicides (3), *Trichinella* (4), ascarids (4), tapeworms (2), surveys of intestinal parasites (4), rat fleas (1), and *litomosoides* (1).

The programme included a Presidential Address on Livestock Parasitology in the United States by Benjamin SCHWARTZ and a Symposium on the Ecology of Vectors of Parasitic Diseases, but these are only noted by title in the printed programme. *H. J. O'D. Burke-Gaffney*

SWYNNERTON, G. H. & HAYMAN, R. W. **A Check List of the Land Mammals of the Tanganyika Territory and the Zanzibar Protectorate.** Reprinted from *J. East Africa Nat. Hist. Soc.* 1950, v. 20, Nos. 6 & 7, 274–392. [Numerous refs.]

A knowledge of wild mammals of many types is an essential part of understanding trypanosomiasis, yellow fever, plague, certain rickettsial diseases and so forth ; it is for that reason that we notice the present list.

We believe that the list reflects the point of view of the two authors, one of them a man with extensive field knowledge in Tanganyika, the other a student in the British Museum (Natural History). The greater part of the paper consists of a systematic list of species and sub-species. Under each is given the scientific name, with a reference to the original description. This is followed by a list of recorded localities in Tanganyika. Nothing else is given except that in many cases English names are provided, which are open to criticism : inevitably they are long, and " invented " : whoever, one might ask, would speak of a " Short-snouted Elephant Shrew " or a " Uasin Gishu Shaggy Swamp Rat " ? The list which deals with several hundred sorts of mammals serves to remind one of the immense complexity and interest of these animals in East Africa : there are for instance 70 species or " forms " of Bovidae.

In addition, there is a list of references, a gazeteer of localities mentioned in the text and an index of names.

It is impossible to test such a list as this except by continual use, but it has all the appearance of being careful, thorough and useful.

P. A. Buxton

RIZZOTTI, G. & NERI, P. Parassiti intestinali osservati nell'Imperial Ethiopian Medical Research Institute di Addis Abeba durante gli anni 1948, 1949 e 1950. [**Intestinal Parasites Found in the Imperial Ethiopian Research Institute, Addis Ababa, between 1948 and 1950**] *Riv. di Parassit.* Rome. 1951, Oct., v. 12, No. 4, 241–4.

The English summary appended to the paper is as follows :—

" The authors report the results of 3,297 examinations, for intestinal parasites, carried out in the Imperial Ethiopian Medical Research Institute of Addis Ababa during 1948, 1949 and 1950."

BOOK REVIEWS

NEW YORK ACAD. MED. **Section on Microbiology. Symposium No. 4. Parasitic Infections in Man.** Edited by Harry MOST. 229 pp., 4 figs. & 1 diagram. 1951. New York : Columbia University Press & London : Geoffrey Cumberlege. [30*s*.]

This volume edited by Dr. Harry Most embodies a series of papers, fourteen in number, given by experts in their own particular field, at the Fourth Symposium of Microbiology held on 15th and 16th March 1949, and sponsored

by the New York Academy of Medicine. In the introductory article by Paul F. RUSSELL, the importance of parasitic diseases to world health is discussed. The stupendous total of prevalent protozoal and helminthic infections, amounting to hundreds of millions, involving a corresponding number of deaths or resultant ill-health, is well documented by surveys and leaves no room for complacency on the part of those who work in these fields. The economic, social and political implications are clearly indicated and possible methods of combating these scourges are discussed. In the author's view applied science has not kept pace with the discoveries made in the laboratory. Clay G. HUFF, in an excellent article, now not quite up to date, points out "The Significance of New Findings in the Life Cycle of Malarial Parasites". Many of these observations were first made on avian malaria. The description by JAMES and TATE of exo-erythrocytic forms of *P. gallinaceum* in the chicken host and later by GARNHAM in the mammalian host was followed by the classical work of SHORTT and colleagues on monkey and human malaria. The author's own work and views are clearly given and it is pointed out that many points in the exo-erythrocytic cycle of mammalian malaria need further clarification. The facts of chemotherapy, relapse and pathology now, however, fit in to a more ordered picture.

James T. CULBERTSON, in dealing with "Immunological Mechanisms in Parasitic Infections", has attempted to explain the mechanism of immunity to parasitic infections on lines which can be applied to other infectious agents. Abundant examples are given from widely different fields of parasitology. On biological grounds he considers that defence mechanisms against all parasites are fundamentally similar. The subsequent chapter on "Immunological Diagnosis of Parasitic Diseases" by John BOZICEVICH deals with the immunology of South American trypanosomiasis, leishmaniasis, filariasis, echinococcosis, schistosomiasis, toxoplasmosis, trichinosis, and amoebiasis. The methods of preparing antigens and certain features in their employment are briefly described. Much was learnt during World War II in regard to certain diseases not generally encountered in the United States and there is scope for wide application of these results in other parts of the globe. It is evident from the author's statements that he considers the complement-fixation test to be the more generally reliable in all the infections discussed and his own work on the subject ensures respect for the views expressed. "Diagnosis of Intestinal Helminths and Protozoa" by Norman R. STOLL is a subject on which the author provides entertainment as well as instruction. In relation to the diagnosis of intestinal protozoa, in particular *E. histolytica*, few would dissent from his statement on p. 70, that compared with the diagnosis of worm infestations "there has not been the same degree of resourcefulness, diversity of attack, and success with the problem of fecal diagnosis". On the matters of routine detection and diagnosis of these intestinal inhabitants much, in the author's opinion, remains to be done. The chapter by William W. FRYE, on "Growth and Metabolism of *Endamoeba histolytica*", gives a lucid explanation of the problems involved and what has been accomplished in this field, but it is clear that much remains to be done to clarify the needs of *E. histolytica* during growth and multiplication. In dealing with "The Physiology of Blood Flagellates" Theodor von BRAND discusses four aspects of the metabolic relationships of these parasites, namely, (1) biochemical studies, (2) physiological implications of cultural studies, (3) relations between trypanosome metabolism and pathological physiology of the host, and (4) the influence which metabolic studies on trypanosomes have had on chemotherapeutic considerations. The fact that 128 references to the literature are given is a good indication of the scope of the article. In spite of the great volume of work on the fundamental aspects of the subject it is surprising that so little of practical value has emerged

on the chemotherapeutic side of the problem. Ralph W. McKee was one of the group of Harvard workers who, under the leadership of Dr. Eric Ball, so successfully studied the problem of metabolism and nutritional requirements of malarial parasites. His article on "Biochemistry and Metabolism of Malarial Parasites" is an account of one aspect of the problem and ends by expressing the view that continued studies of the metabolic and enzyme systems of these parasites may lead to the production of specific anti-malarial agents. The story is continued by Q. M. Geiman, another member of the team, in a chapter on "The Cultivation of Malarial Parasites". Although he writes "This painstaking and often exasperating experimental program did not offer the satisfaction of finding or proving the value of new drugs. . . ." the fundamental importance and value of this joint effort by biochemists and parasitologists, appear to the reviewer to be outstanding in the field of scientific endeavour.

Basic studies on the "Metabolism of Helminths" are described by Ernest Bueding, who has made notable contributions in a field which until recently has been left untilled. Wide variations in the metabolic characters of parasitic helminths have been recognized, some of which survive by oxidative reactions, while for others anaerobic conditions appear to be necessary. For practical purposes they have been put into two groups on this basis, *Litomosoides carinii* of the cotton rat representing the former group, and *Schistosoma mansoni* the latter. The metabolism of various substrates is discussed and the importance of the effect of anthelmintic agents on metabolic processes in relation to the development of new types is also dealt with. A study of the exact nutritional needs of parasitic helminths is deemed necessary in this connexion but meantime the greatest successes have been scored by empirical methods. H. H. Anderson contributes a long and interesting article on "Pharmacological Evaluation and Clinical Application of Amebacides (with Special Reference to the Thioarsenites)". The treatment of chronic refractory amoebiasis has engaged the attention of the author and his colleagues for some time and they have shown that the thioarsenites are of value for the treatment of such cases, but require further study. The reviewer, however, fails to understand why "Agents which act directly on both motile and cystic forms of amebas are needed". *In vitro* methods of testing potential amoebicides as well as those *in vivo* with the use of different laboratory animals are described.

A concise account of the "Status of Antimalarial Drugs" by G. Robert Coatney deals with the clinical application of the chief anti-malarials in current use. The author concludes that while we still do not possess the ideal drug for the treatment of malaria, we have at our disposal agents which will "do nearly all that is required". Chloroquine is favoured as a suppressant, while chlorguanide [Proguanil] has the unique property of being a causal prophylactic for *P. falciparum*. The exposure of troops to tropical conditions during the late war led to the need for more potent anthelmintics, especially in the treatment of filariasis, from which large numbers of American troops suffered. In dealing with the "Therapy of Filariasis and the more Common Intestinal Helminths", H. W. Brown notes that tri- and pentavalent antimonials and arsenicals have been used with considerable success against *Wuchereria bancrofti*, causing a marked reduction in numbers of microfilariae and apparently having some effect against adult worms. Hetrazan, a non-metallic piperazine derivative, introduced by Lederle, reduced the numbers of circulating microfilariae to 1 per cent. of the original and affected the adult worms to some extent. The use of antimonials in *Loa loa* and *Onchocerca volvulus* infections was not so satisfactory and hetrazan produced only a temporary effect. It appears that the latter drug may also affect *Trichinella spiralis*. The final article by F. J. Brady describes "The Treatment of Schistosomiasis," in which the use of trivalent antimony compounds has given the best results.

These substances are toxic, however, and their mode of action has not yet been determined. With the advent of certain non-metallic Miracils, which possess a xanthone structure, and can be given by mouth, hopes were entertained that an advance had been made in the chemotherapy of schistosomiasis. It now appears that while some cures have been obtained with Miracil D, relapses are the rule after treatment, and the trivalent antimonials are still the most effective agents we possess. *J. D. Fulton*

Pessôa, Samuel Barnsley. **Parasitologia Médica.** [Medical Parasitology] 3rd Edition. 885 pp., 465 text figs. & 41 coloured figs. on 2 pls. 1951. Rio de Janeiro : Editora Guanabara Waissman Koogan, Ltda., Rua do Ouvidor, 132.

Five years only have elapsed since the first edition of this work was published and the present is called the 3rd edition. There is no indication when the second was published for this one reprints the preface to the first and a few prefatory lines to the third, saying that, though only a short time has passed since the second was published, new knowledge and developments have necessitated a revision and amplification. The first edition was reviewed in this *Bulletin* 1947, v. 44, 939, and it is our duty now to point out in what respects revision and amplification have been embodied. By using a slightly smaller, but, nevertheless, a clearer, print and by increasing the length of the pages by one-fifth a considerable saving of space has enabled additions to be made without altering to any great extent the length and size of the book. The third edition is only 27 pages longer than the first and many of these are made up by a full bibliography and a more detailed index. Whereas the former bibliography occupied 4½ pages and was on general lines, the present has separate sections for the different Families and Genera and occupies 18 pages, and the index has been enlarged from 22 to 30 pages. Ninety-eight more text figures have been introduced and 10 more coloured figures on the two plates. Many of the illustrations appear more clearly reproduced in the present than in the previous edition, unusual when the wearing of blocks is wont to result in poorer reproduction in successive issues. The plate of malaria parasites, instead of appearing as a frontispiece, now finds its proper place in the malaria chapter.

A detailed comparison of the first with this, the third, edition shows that the author has made a very thorough and painstaking revision. Almost every chapter affords evidence of this and the embodiment of recent research. There are 5 new chapters ; on *Trypanosoma rangeli*, on Spirochaetes, on Treponemata, on the relapsing fever spirochaetes separately under the generic name *Borrelia*, and on Leptospirae. In the earlier edition these were just mentioned under their different vectors. *Schistosoma haematobium* and *S. japonicum*, instead of insertion as a sort of appendix to the chapter on schistosomiasis mansoni, are now given a separate chapter, though the letterpress is reproduced *verbatim* and they have but a few lines each, since they are not Brazilian schistosomes. The chapter on the treatment of amoebiasis has been brought up to date by insertion of new therapy since 1945 and a section on a free-living amoebae has been added.

The chapter on sources of error in faecal examinations might with advantage be enlarged ; only two are referred to, namely the possibility of mistaking leucocytes and tissue cells for amoebae and confusing *Blastocystis* with amoebic cysts, the last of which none but the veriest tyro in microscopy could mistake. A very useful addition is a series of tables for differentiating *Entamoeba histolytica, E. coli, E. gingivalis, Endolimax nana, Iodamoeba bütschlii* and *Dientamoeba fragilis* in vegetative and cystic forms, unstained and stained.

The African trypanosomiases have been left as before, with little more than transitory reference ; for example, *T. rhodesiense* and its infection are disposed of in 9 lines, presumably because they are not interesting to workers in Brazil. The work of SHORTT and GARNHAM [wrongly spelt Garham throughout] is accorded transient reference only.

In the Helminth section there has been included a clear schematic representation of the two-fold development of *Strongyloides stercoralis* and another of the scheme of evolution of the *Ankylostomidae* and details of the distribution of ankylostomiasis in the different States of Brazil. The chapter on the treatment of Bancroftian filariasis has been enlarged and brought up to date and there are two new pages of diagrams of helminth ova and the larvae of *Necator americanus* and *Strongyloides stercoralis*.

In the Entomological section in the part dealing with the campaign against malaria and anophelines, zooprophylaxis is mentioned ; also the protection of man against mosquito-bites and the attacking of mosquitoes by fumigation, spraying, the use of DDT and natural enemies. Drainage, however, is mentioned only casually, whereas in the first edition more space was given to it and pictures were reproduced illustrating canalization and drainage. An addition to this section is a detailed key to Brazilian Psychodidae, occupying 8½ pages.

Lastly, in the section describing laboratory techniques, there has been added an account of the method of cultivation of *Trypanosoma cruzi*, and of the preparation of antigen for complement fixation in infection by this parasite and for the quantitative technique of Pedreira de Freitas and Almeida of 1949, and the examination for spirochaetes by dark-ground illumination, by staining and by culture.

To conclude, the present edition is a great improvement on the first, the print is good, the binding strong, misprints have been corrected, the illustrations carefully chosen and well reproduced and the author is to be heartily congratulated on the successful accomplishments of a heavy task.

H. Harold Scott

HERMS, William B. [Sc.D.] **Medical Entomology. With special reference to the Health and Well-being of Man and Animals.** 4th Edition. pp. xvi+ 643, 191 figs. & 1 coloured pl. 1950. New York : Macmillan Co. [67*s.* 6*d.*]

The previous edition of this text-book was published in 1939 [this *Bulletin*, 1940, v. 37, 79]. The present edition has been revised to include the new information which has emerged in many aspects of medical entomology as a result of field researches stimulated by the circumstances of the recent world war. The general plan of the book remains unaltered, but considerable rearrangements have been made within some of the chapters ; many of the figures have been improved in clarity and enlarged. A few illustrations have been discarded. Fly control is no longer accorded a chapter to itself but has been added to the chapter on the biology and medical significance of the house-fly. Notable deletions include the last chapter of the earlier editions which dealt with the uses of various arthropods in medical practice. The section on the treatment of malaria is discarded. Keys to anopheline mosquitoes of the United States are omitted and the morphology of the male genitalia of mosquitoes is now greatly abridged. Fly-traps and poisons and bed-bug control, other than by contact insecticides, are also removed from the text entirely. It should be noted that there is only a brief consideration of the theoretical possibilities of the exo-erythrocytic cycle in human malaria. It may be that

the revision of the section on malaria preceded the rapid developments in this field in recent years. Nevertheless it appears as an unfortunate omission in a book of this kind.

As regards new subject matter, the use of contact insecticides, particularly DDT, is inevitably a conspicuous feature of the revised sections on the control of medically important insects. Some of the new repellents also find a place appropriately in the text. Other subjects which contribute to the new matter include the problems of the epidemiology and vectors of the virus encephalitides, the substantial advances in recent times in our knowledge of scrub typhus and *Trombicula*, the rôle of different mosquito species as vectors of filariasis and dengue, and of flies as possible disseminators of poliomyelitis. There is a new list of the important malaria vectors of the world.

The arthropods selected for discussion from the biological or medical point of view, and those for which control is considered in detail, are generally representatives of the pest or vector species of the United States, except where the distribution of an arthropod and the disease it transmits are restricted to parts of the world elsewhere. Thus, for example, the malaria vectors and hard ticks discussed in detail are almost exclusively of the United States region.

This edition still retains a considerable amount of detail on arthropods which are essentially parasites of veterinary interest and importance.

The author has succeeded by numerous well-chosen deletions in bringing the book up to date without increasing its size by more than about 70 pages.

D. S. Bertram

Muirhead-Thomson, R. C. **Mosquito Behaviour in relation to Malaria Transmission and Control in the Tropics.** pp. viii+219, 16 pls. & 22 figs. 1951. London : Edward Arnold & Co., 41, Maddox Street, W.1. [30*s*.]

The author's work on the biology of adult mosquitoes and the early stages is familiar to all who are interested in the subject, indeed, one might say that his studies on *Anopheles minimus* in Assam set a new standard in these matters. This was because of the skill with which he could make a field observation, then bring the problem into the laboratory and analyse it, and then again take it back into the field, developing simple but conclusive experiments.

In the present book, Muirhead-Thomson looks back over his own work and discusses it in relation to similar studies which others have carried out, particularly in the last 15 years. His method is selective and he has made no attempt to cover every side of mosquito behaviour (using that word in a wide sense, to cover the insect's conduct of its affairs in nature).

The studies on the biology of the adult insect are brought into relation with the use of new, lasting insecticides and it is pointed out that owing to these materials and to campaigns against mosquitoes in houses, the subject of malariology has been reorientated, less emphasis now being paid to studies on larvae. As the author points out, this change in emphasis is an excellent example of the falsity of the distinction between what is sometimes described as " academic " and practical in applied research : as soon as DDT became available, there was an immediate need of every scrap of information about the house haunting habits of mosquitoes, their resting places and so forth.

The text is about equally divided between chapters on the adult mosquito and the larva. The book will be of real service to malariologists and will tend to cause them to think in a critical, biological way. It might also prove to be of great interest to biologists in general.

P. A. Buxton

STRODE, George K. [M.D.] [Editor] & others. **Yellow Fever.** pp. xv+710, 77 figs. 1951. New York, Toronto & London : McGraw-Hill Book Co. Inc. [$9.50]

The story of how, with gradually increasing knowledge, methods have been devised for the effective control of yellow fever forms one of the most dramatic and exciting episodes in the whole of medical history. The drama is made up of three acts, a long first act lasting for just over 300 years, a second act lasting for just under 30 years, and, with ever increasing tempo, a triumphant third act lasting less than 20 years. The curtain rises in 1598 when G. W. (probably George WHETSTONE, Elizabethan soldier, explorer, and incredibly bad poet) wrote " The cure of the diseased in remote regions ", the first text-book of tropical medicine, wherein he gave a garbled account of yellow fever and typhus. This first act ends in 1901 when REED, CARROLL, and AGRAMONTE, acting on the theory put forward in 1881 by Carlos Juan FINLAY, demonstrated that yellow fever was due to a virus and was undoubtedly transmitted to man by the bite of the mosquito *Aëdes aegypti*. LAZEAR, who almost certainly made the first successful transmission experiment died of yellow fever before the work was completed. This discovery enabled General William GORGAS to free Havana from yellow fever and to make possible the construction of the Panama Canal, though it may be noted that in 1948 yellow fever was still to be found in the jungle only a few miles from Panama City. Soon after its foundation in 1913, the International Health Commission of the Rockefeller Foundation became interested in the question of yellow fever for on visiting the Far East, the director of the Commission, Mr. Wickliffe ROSE, quickly discovered that in India and other countries there was considerable anxiety on account of the possible introduction of yellow fever as a result of the opening of the Panama Canal. The first World War delayed investigations into the problems of yellow fever control but in 1920 the first Rockefeller Commission visited West Africa and made preliminary investigations, although actual cases of yellow fever were not then seen. In 1925 yet another commission under Dr. Henry BEEUWKES was sent to West Africa with the object of isolating the causative organism, discovering the method of transmission, identifying the areas where the disease was actually present, and determining the relationship of yellow fever in Africa and South America. It was the work of members of this commission, STOKES, BAUER, and HUDSON [this *Bulletin*, 1928, v. 25, 537, 538], which first showed that yellow fever could be transmitted to rhesus monkeys, and thus enabled the curtain to rise on the triumphal third act.

It is appropriate that 1951 should have been selected by the authorities of the International Health Division of the Rockefeller Foundation for the publication of this history of their remarkable achievement, for 1951 is the centenary year of the birth of Walter REED and the fiftieth anniversary of the successful transmission of yellow fever to human volunteers : it is also the seventieth anniversary of Carlos Juan Finlay's first pronouncement of the mosquito transmission theory and it has been suitably marked by the award of the Nobel Prize for Medicine to Dr. Max THEILER for his outstanding work on yellow fever. The story of the yellow fever investigations carried out by the Rockefeller Foundation, and by other agencies with the support and co-operation of the Foundation, is here related by Dr. George K. Strode, the present director of the International Health Division, and by eight members of the Foundation, all of whom have taken an active part in the elucidation of the problems of yellow fever.

After a short preface by G. K. Strode, the earlier knowledge of yellow fever is briefly outlined by A. J. WARREN. Max Theiler then deals with the virus and J. B. B. BUGHER with the pathology of the disease : the latter writer also

describes the mammalian host. Immunology is discussed by K. C. SMITHBURN and the arthropod vectors by L. WHITMAN. The clinical aspects and diagnosis of yellow fever are adequately dealt with by J. A. KERR. R. M. TAYLOR gives an account of the epidemiology while H. H. SMITH outlines the methods now available for controlling the infection. Finally, G. K. Strode gives a brief account of the cost in men and money. Where all the chapters are so excellent it is almost invidious to attempt to single out any for particular mention. Special praise, however, must be given to the brilliant account of the epidemiology by R. M. Taylor. There is, however, one point on which the reviewer must cross swords with Dr. Taylor, the epidemiology or rather endemiology of the disease in Africa. Taylor believes that urban rather than rural endemicity is the main factor in maintaining the infection in West Africa. "Until the vector is effectively controlled in cities . . . it is not reasonable to disregard completely the participation of urban communities (cities) in the retention of the infection. . . . It may be remarked in passing, however, that in rather densely populated areas, such as exist along the west coast of Africa, and where the domesticated type of aegypti is widely disseminated, it is not necessary to invoke any other explanation of the endemicity of yellow fever than the presence of this mosquito. Before accepting the likelihood of other means of seeding the virus, it would be required to rule out the possibility that aegypti may be involved. In any event, it is highly probable that this mosquito and the man-mosquito cycle is responsible for the majority of human infections over a great part of West Africa." While no one will dispute that *Aëdes aegypti* is responsible for the majority of human infections over a great part of West Africa, the statement that endemicity in cities rather than endemicity in rural areas is a major factor is open to the gravest doubt. There are few "cities" in West Africa where the population, men, women, and children do not own farms in the country and visit them at frequent intervals. Even so, examination of sera, from Accra, Kumasi, and Freetown, during the war, showed that all children were unprotected and no immune bodies were found in persons who had not been alive at the time of the last known epidemic. In Allantown, at a time when four cases of yellow fever occurred in Army personnel in the neighbouring bush, no person in the village under 16 years of age showed immune bodies and a survey by highly competent entomologists failed to reveal any trace of *Aëdes aegypti* either in the village or in the bush. Similarly, a small girl from Accra visited a rice farm with her mother some 30 miles away in the forest region. There she contracted, and died from, yellow fever. Examination of all children under 10 years of age in the two neighbouring villages showed a complete absence of immune bodies and again thorough examination failed to reveal any evidence of the existence of *Aëdes aegypti* at the period of the year when the case occurred.

In any work written by a number of writers there is bound to be some overlapping. In the present work such overlaps are not serious and merely serve to emphasize important points. On the other hand there are very few omissions. One of these is the story of Miss Fanny WALDRON. This lady as a hobby had been accustomed to lead expeditions to the tropics to collect specimens for the British (Natural History) Museum. In 1934, when well past the age of 60, she conducted an expedition to the Gold Coast and there in the forest region south-west of Kumasi she shot a monkey which was the first in Africa to be found with immune bodies to yellow fever. Incidentally, it was also a red colobus new to science and its skin and skull now repose at South Kensington as the type of a new species, *Colobus badius waldroni*.

A particularly valuable feature of this book is the extensive bibliography of papers on yellow fever published by members of the International Health

Division of the Rockefeller Foundation and their collaborators. The results of these labours may be summarized as : the findings of an effective means of immunization against yellow fever ; the discovery of the mouse protection test whereby the presence of yellow fever both in time and place can be accurately measured ; the demonstration that yellow fever is not primarily a human disease but one of primates in general ; and the light that yellow fever investigations have thrown on other virus infections. The price of these investigations has been almost infinitesimal : in money, about £5 million ; in men, the lives, it is true, of six distinguished workers, H. B. Cross, Adrian Stokes, Hideyo Noguchi, P. A. Lewis, W. A. Young, and T. B. Hayne. [The technician who died in London is not mentioned.] The cost has thus been less than that of one day of war, the casualties less than those of a few minutes' fighting.

In the preface it is modestly suggested that " this work represents an experience that can be studied with profit by epidemiologists, virologists, entomologists, biologists, mammalogists, climatologists and ecologists, as well as practically everyone interested in a subject involving any of the biologic sciences ".

It is perhaps not too much to suggest that this book will remain a monument for all time. When the history of this war-racked century comes to be written it will bear witness to the fact that, despite the concentration on ever more deadly means of destruction, at least a few men were prepared to devote their lives and energies, and with success, to a great enterprise so that mankind might be freed once and for all from the deadly scourge of yellow fever.

G. M. Findlay

Rogers, Leonard [K.C.S.I., C.I.E., M.D., F.R.C.P., F.R.C.S., F.R.S., I.M.S. (retd.)] & Muir, Ernest [C.M.G., C.I.E., M.D., F.R.C.S. Edin.]. **Leprosy.** Addendum to the Third Edition. 16 pp., 2 figs. 1951. Bristol : John Wright & Sons Ltd., 42–44, Triangle West & London : Simpkin Marshall Ltd. [2*s.* 6*d.*]

Since the 3rd edition of the authors' *Leprosy* appeared some six years ago, much progress has been made with the sulphone group of drugs and " indeed they have come to be regarded almost universally as giving the most effective remedy for leprosy ". Therapeutic activity has been claimed for a few other drugs also. In this addendum the authors devote 15 pages to describing these drugs, their use and effects.

The monograph opens with a brief history of the sulphones and their action. Special attention is paid to the parent substance DDS and to sulphetrone, which are most commonly used at present. Diagrams illustrate the chemical formulae and blood-levels. The various methods of administration are described and their comparative values assessed. Toxic effects and dosage are discussed and progress under treatment described. There is a brief reference to the combined use of sulphones and hydnocarpus oil. The possibility is discussed of the use of DDS as a prophylactic in households where contacts cannot be isolated completely.

No evidence is available that streptomycin is beneficial in leprosy, alone or in combination with other drugs.

Promising results have been reported from the use of thiosemicarbazone, but it is too early to evaluate it. Reference is made to the claims made for cepharanthin, particularly by Japanese workers.

The subject matter of this useful addendum has already been covered in individual abstracts in this *Bulletin*.

H. J. O'D. Burke-Gaffney

CHELLAPPAH, S. F. [O.B.E., M.R.C.S. (Eng.), L.R.C.P. (Lond.), etc.] & JACOCKS, W. P. [M.D., Dr.P.H.]. **A Guide to Health Unit Procedure in Ceylon.** 2nd Edition. 150 pp., 1 plan. [1948.] Colombo : Ceylon Government Press. [10*s.*]

When, in England, the term " Health Centre " has been debased to denote merely a glorified dispensary for the sick, it is refreshing to find that in some countries a " Health Unit " still signifies some relation to well-being and the prevention of disease.

The reviewer remembers well the first edition of this book, and though at the time the authors' concept of the type of health unit suitable for a tropical country differed somewhat from his own, he can even now recall the pleasure and profit which he derived from a study of its very informative pages.

This edition, while retaining all that was good in the old, has been brought up to date and has had three more sections incorporated in it, namely the chapters on " Fairs and Festivals " (IX), " Nutrition " (XII) and " The Supervision of Dispensaries, Rural Hospitals and Maternity Homes " (XIV). Minor verbal amendments and re-arrangements have been made.

There are 16 chapters and 17 appendices. The first two chapters deal with the selection of the area of operations and with the means of obtaining the co-operation of the public. This latter chapter indicates as well desirable ways in which the public may co-operate, namely, by the provision of furnished buildings for clinics, of protected wells, water pumps and prizes for health education, as well as active participation in certain features of the work of the unit. Chapter III deals with all matters relating to personnel, IV with procedure, where the importance of education as a means of obtaining the co-operation of the public is rightly emphasized, V with vital statistics, VI and VII with epidemiology and quarantine. Chapter VI dealing with epidemiology must have been a difficult one to draft, not so much because of what to include but because of what to omit. The draftsman has been successful in presenting a fair selection of types for the reader's consideration. [One minor criticism may be made. Is there any evidence that the DDT spraying of buildings has any effect on the spread of plague ? Application of DDT dust to rat burrows (which is not mentioned) might be a useful measure, but the reviewer doubts very much if the spraying of buildings is of the slightest use. Nevertheless this measure is recommended twice.] The next two chapters, VIII and IX, deal with environmental sanitation along orthodox lines. Chapters X, XI and XII treat of the young and of nutrition ; X and XI specify the duties of the health unit staff in maternity and child welfare work (X) and school hygiene (XI), while that on nutrition indicates the broad lines of the programme on nutrition to be conducted by the Medical Officer of Health. Chapter XIII indicates the scope of the unit laboratory, XIV details the duties of the Medical Officer of health regarding the supervision of dispensaries, rural hospitals and maternity homes in his area. XV indicates the desiderata for maps, programmes, reports, staff conferences and forms, while XVI, the last but certainly not the least, deals with budgets. The rather remarkable thing about the two specimen budgets is that the rates of salaries for all employees other than the Medical Officer of Health have risen appreciably since 1935, the greatest rise being one of 200 per cent. in the salary of the messenger (Peon), whereas the Medical Officer of Health's emoluments have apparently suffered a reduction of some 8 per cent. Experienced readers will find a sadly familiar sound in the sentence " It will be noted that the number of public health nurses is inadequate for the population ".

The 17 appendices occupy some two-thirds of the book and range over such subjects as type of plan for the health unit building, specimens of forms, lists

of equipment for various establishments, detailed instructions on filing and on practically every other activity of the unit, including an appraisal of its worth.

When one sees how the paper work appears to have grown between the two editions (though it is possible that the growth is merely apparent because more has been included in the second edition), one can appreciate that the clerk's salary should have been raised. Comparison of his scheduled duties with the formidable list of forms and files leads one to the conclusion that he must be the busiest member of the staff, if, indeed, he can cope with what he is supposed to do. One advantage of putting everything or nearly everything down on paper in an orderly way is that one can the more readily see what can be sacrificed without loss of efficiency. A reviewer in a distant country cannot offer comment on detail, but it seems to the writer that a drastic pruning of the paper work might be contemplated with advantage to all concerned.

The new edition is much more voluminous than the old owing to the inclusion of more matter and a more prodigal use of paper (in the first 49 pages there are 13 which are completely blank). The printing and proof reading have been well done and this edition may be cordially recommended as a worthy successor to the original. *J. Balfour Kirk*

WORLD HEALTH ORGANIZATION. **Pharmacopoea Internationalis.** [International Pharmacopoeia] First Edition. Vol. I. pp. xviii+406. 1951. Geneva: Palais des Nations. [35*s.*, $5, Sw. fr. 20.] [*Bull. World Health Organization.* Suppl. 2.] [Review appears also in *Bulletin of Hygiene*]

In the International Pharmacopoeia the World Health Organization has brought to fruition a project that was already felt to be necessary as far back as the middle of the last century, and the first seeds of which were sown 50 years ago, at a conference in Brussels in 1902. It had long been, and it has never ceased to be, a source of confusion (and indeed of danger to the traveller who may need to have the same prescription dispensed in different countries) that the various national pharmacopoeias do not always agree in the standards, strengths and nomenclatures of the drugs they describe. At the Brussels Conference there was therefore drawn up an International Agreement for the Unification of the Formulae of Potent Drugs; this was ratified in 1906, and it considerably influenced the national pharmacopoeias subsequently published. Many inconsistencies remained, however, between various national compilations, and further international attempts were made to secure uniformity. This culminated in the setting up of a Technical Commission of Pharmacopoeial Experts by the Health Organization of the League of Nations in 1937, for the purpose of revising the existing Agreement and expanding it into a limited international pharmacopoeia. The work was held up by the second world war, after which it was inherited by an Expert Committee on the Unification of Pharmacopoeias, set up for the purpose in 1947 by the World Health Organization, one of the specialized agencies of the United Nations. Continuity of effort was made easier by the fact that the Chairman of the Expert Committee, Dr. C. H. HAMPSHIRE, Secretary of the British Pharmacopoeia Commission, had presided over the original League of Nations Technical Commission, which had also included two other members of the new body, namely, Dr. Baggesgaard RASMUSSEN of the Danish Pharmacopoeia Commission, and Dr. Fullerton COOK, Chairman of the Committee of Revision of the Pharmacopoeia of the U.S.A. The WHO Expert Committee have now produced this, the first International Pharmacopoeia, publication of which was formally approved by the Third World Health Assembly in May 1950.

The form and general arrangement of the pharmacopoeia follow the conventions of the most modern national pharmacopoeias. Precise specifications for the more important drugs and preparations are given in 199 monographs covering not only time-honoured and long-proven remedies but a wide range of modern synthetic substances, sera, vitamins and hormones. Then there are 43 appendices, detailing techniques for biological assay of potency and toxicity, limit tests for various metals and salts, tests for sterility, tables showing the usual and maximal doses, and other practical information indispensable to any self-contained pharmacopoeia. Volume II, publication of which is due shortly, will complete the work, with monographs and appendices on injections, certain tinctures, tablets and—most important—on antibiotics, a field that is developing so rapidly that agreement on standards and methods of control could not be reached in time for Volume I.

The present production is well bound, and printed in clear type on good paper. It is available in separate English and French editions, and will soon be available also in Spanish. It is a solid contribution not only towards international uniformity but also towards meeting the needs of independent countries of limited scientific and technical resources. Peoples of under-developed countries are acquiring political independence apace. Among the numerous trappings of nationhood many of them will, sooner or later, require a national pharmacopoeia. For any such country, as indeed for any whose national pharmacopoeia is yet to be established or stands in need of revision, here is a ready-made compilation which that country is free to adopt as its official pharmacopoeia if it so wishes. Any gaps occasioned by particular national requirements may then be filled in locally by appropriate supplements, where necessary.

The extent to which this pharmacopoeia, or any part of it, will in fact be officially adopted by individual countries will be a measure of its success, and it deserves such success in large measure. It reflects the highest credit on the disinterested labours not only of the Expert Committee but also of the many other experts, whose advice on specific aspects was given in an equally disinterested spirit of service to a public larger than that of any merely circumscribed community. *E. M. Lourie*

The West Indian Medical Journal

The first issue of this new journal is dated September 1951. It is the successor to the *Jamaica Medical Review*, and the good will and assets of that review have been handed over to the University College of the West Indies to assist in the production of this journal. The Editorial Board comprises representatives of the University College and the *Jamaica Medical Review*. This first issue is well printed and produced ; it contains articles on yellow fever, nutritional conditions, yaws and other subjects, and several of these papers will be abstracted in the *Tropical Diseases Bulletin*. The intention is that it should be a source of information on conditions in the whole of the West Indies.

The subscription rate is 5*s*. 3*d*. (U.S.A. 75 c.) per copy (post free) or 10*s*. 6*d*. ($1.50) per annum (but it is not stated how often the journal will appear).

The Bureau of Hygiene and Tropical Diseases extends a cordial welcome to this new journal. *Charles Wilcocks*

Printed in Great Britain under the authority of Her Majesty's Stationery Office
by The South Essex Recorders, Ltd., Ilford.
(22) Wt. P27/388 4/52 S.E.R. Ltd. **Gp. 432**

ALPHABETICAL LIST OF AUTHORS OR SOURCES

[Continued overleaf